Berne the Swiss Government has inaugurated a weather bureau station on the Jungfrau, which rises 13,672 feet above sea level. Dr. Philippe Etter, Minister of the Interior, was the principal speaker at the ceremonies. The project was financed largely by private scientific and Alpine organizations.

DISCUSSION

THE CLIMATIC HYPOTHESIS IN GEOGRAPHY

A SURVEY of geographic literature shows coherent development of the data of landscape in terms of climate. Caution, however, is desirable, because of the uncertainty of the meteorological material upon which "climate" as such has been based. Unless stability of meteorological conditions over periods long enough to make averages meaningful can be demonstrated, the whole framework of climate based upon statistical averages will have to be abandoned. The researches of Sears and of the other pollen-analysts have shown rather profound changes in climatic conditions to have been taking place during the past three to five hundred years.[1] The analyses of Douglas, working on tree rings in connection with archeological investigations in the southwestern part of the United States, have shown that throughout the reconstructable period of the ancient pueblos climatic irregularity has characterized the yearly progress of atmospheric conditions.[2] For longer periods, Antevs in the United States and DeGeer in Sweden by the study of varves have demonstrated the fluctuations of climate in immediately post-Pleistocene times and for considerable periods since.[3] C. E. P. Brooks has collected much evidence of the history of climate.[4] The view which must emerge from the consideration of this evidence is that climate is in a state of continuous fluctuation and change. It is not static; it varies from year to year, from decade to decade, and from millennium to millennium, though perhaps with measurable cycles and epicycles upon possible longer cycles from glaciation to glaciation.

Recently Koeppen and others have constructed climatic systems on the basis of averages of meteorological data.[5] These systems are utilized more or less widely in the "regional" organization of geographical data and in conjunction with the more detailed study of small "regions," perhaps more in the United States than in Europe.[6] Geographers have been able to organize the data of landscape more successfully in terms of climate than in any other way. Alexander von Humboldt foreshadowed the way in which geography was to develop when he described the domain of plant geography in the Kosmos and when he invented the isotherm. The publication of "The Origin of Species" started a combing of the world for evidence of natural selection, of which search zoogeography was a by-product, though its first phases had been illuminated by Buffon. Wallace's "Geographical Distribution of Animals" rests philosophically on a foundation of climatic difference. Davis, in his physiographic work, found it necessary to introduce modifications of his system in the case of arid regions, and had his observational experience been wider he would perhaps have worked out systems for the humid tropics and for the polar regions of frozen soil.

If climate has history, if it consists of continuously varying combinations of the meteorological elements, as was presented above, it would seem impossible to measure it in terms of averages; its data are too elusive. As a consequence it will be necessary to abandon the various schemes which have been proposed and to proceed with the investigation of climate along other lines. Furthermore, the distribution of vegetation, to take but one element in the "geographic complex resting on climate," is not determined by the distribution of average meteorological conditions (whether measurable or existing, or not), but rather, probably, by extremes of temperature or of rainfall or of some other factor occurring in certain unascertainable combinations during certain, perhaps ascertainable, critical periods in the lives of the individuals and species making up the vegetation of the world.

If the regional organization of geographic material is impossible in the tradition of von Humboldt, Wallace and Koeppen, if the serviceability of climatic maps expressed in terms of isotherms, isohyets and isobars is open to question because of the defect of averages, what remains for the climatic hypothesis which has proved so useful in geography? It is probable that landscape should be considered as a system of variables—climate varies in time, as we have seen; the geologic "base" of landscape varies also, diastrophically. Landscape as a variable has been summed up diagramatically by Sauer,[7] and it is the complex pattern there expressed to which geographers should devote themselves. If climate, though not alone, work through time to produce "forms" of the "natural landscape" and if climate be variable, it becomes necessary to study somehow the ways in which the other variables

[1] *American Anthropologist*, 34: 610–622, 1932.
[2] Carnegie Inst. of Wash., Pub. No. 289, 1919–26, 2 vols.
[3] Ymer, 45, 1925; Carnegie Inst. of Wash., Pub. No. 352, 1925.
[4] "Climate through the Ages," London, 1926; "The Evolution of Climate," London, 1925.
[5] "Grundriss der Klimakunde," etc., Koeppen-Geiger, "Handbuch der Klimatologie," *et al.*
[6] *Univ. Calif. Pub. in Geog.*, 2 p. 272; *Papers*, Mich. Acad., 1932, p. 248; *Annals*, A.A.G., 26, 1936, p. 159. These papers are cited as samples, and are not necessarily bad in themselves otherwise.
[7] *Univ. Calif. Publications in Geog.*, 2, p. 41.

behave in reference to this one. In this way, climate may be approached through tangible evidences of its past. Pollen analyses, tree ring analyses, soil studies, studies in plant and animal ecology and studies in archeology (e.g., the work of Douglas) may be organized in a complex whole, the study of which in the field and in the laboratory may provide a body of data so coherent that geography will not have to depend on an untenable foundation of statistical climatic regions, the data of which are so complex as to defy reduction to averages.

STANLEY D. DODGE
THE UNIVERSITY OF MICHIGAN

FERTILITY AND INTELLIGENCE OF COLLEGE MEN

VERY little based on direct evidence is known concerning fertility differentials with respect to intelligence. Such inferences as have been attempted are based primarily upon correlations of the intelligence scores of children with the number of their siblings—*i.e.*, with the fertility of their *parents;* but it is plainly the correlation of intelligence with the individual's own fertility which is of eugenic interest.

Opportunity is arising to collect a limited amount of direct evidence from that part of the population which was tested in colleges with the early group tests. Such data are obviously imperfect; they are incomplete, since students tested as freshmen in 1918 are now about 37 years old and may produce children for another dozen years; they are affected by selective factors, since it is likely that certain types of alumni are disproportionately represented in the available records on fertility; and they are restricted to a single social class. Nevertheless, it seems desirable to learn what we can about this important social phenomenon. Exploratory analyses have therefore been made on the records of the Brown class of 1924 (tested in September, 1920, with the Brown University Psychological Examination).

One hundred sixty-eight graduates for whom there are records beyond the twenty-eighth birthday may be divided at their median into a high and a low scoring group. Chi-square comparison of the distributions of ages at last (reproductively significant) record for these two groups indicates that they may be regarded as samples of the same population ($P = .7$), and that therefore neither will be greatly penalized in this respect by a direct comparison. Such a comparison gives .84 children per man for the high group and .61 for the low, a ratio of about 1.4; these figures, of course, are minima.

A more satisfactory evaluation may be made by considering only those men whose last reports fell subsequent to a given birthday; these may be divided at the median as before, and for each of the two subgroups the number of children per man born before the specified birthday may be computed. Such figures are still minima, but the "temporal opportunity" to have children has been accurately equated as between the two subgroups compared at each birthday. Comparisons of this sort made for the birthdays for which significant data are available (29–34) yield High/Low ratios of 1.5 to 2.1, derived from per-man reproductivities of .42 to 1.00 for the high group and .20 to .54 for the low. The N's run from 139 to 49 for the undivided groups (*i.e.*, half as large for the high and low groups).

Various measures of reproductive efficiency, however, show insignificant differences between high and low scorers. Thus the 52 high-scoring married men have produced .19 children per man per married year and the 54 low-scoring ones .20. The intervals between marriage and first birth are very close to two years for those subgroups (35 and 37 in number) of high and low scorers who have had children. The numbers of children born in a given age period per man married at the beginning of the same period are even slightly higher for the lower groups (*e.g.*, 1.17 and 1.25 for children born between 29 and 34 per man married by 29). Finally, the numbers of children born after a given birthday to high and low groups are not greatly different; the high group has a slight advantage for the earlier birthdays and the low for the later ones.

Further analysis shows that the effective differential is in fact entirely in the marriage rate and not in the reproductive efficiency. Thus for the 139 men last known at 29 or above (who are typical), we have the following cumulative percentages:

	Married by							Unmarried by
	23	24	25	26	27	28	29	29
High	9	15	26	31	48	57	60	40
Low	4	10	12	22	27	37	48	52

By means of an arbitrary set of assumptions we may guess at the final reproductivities of the groups. For this purpose we assume that a married man for whom three years have elapsed since his marriage or the birth of his last child, or an unmarried man over 32, will have no more children, while all others will have one more each. The application of these assumptions equally to the two groups raises the per-man reproductivity of the high scorers from .84 to 1.55 and that for the low scorers from .61 to 1.26, but depresses the High/Low ratio from 1.39 to 1.23. Taking into account that the number of persons to be reproduced is slightly more than double the number of subjects, and that even in this privileged group some children