four (11 chapters—or 300 pages) is a regional world survey based on climate and vegetation regions; in the fifth section selected nation-states are briefly considered. The final part is devoted to some observations on man's relation to space and time.

*Geography in World Society* is the outgrowth of 35 years of teaching experience by the authors; as such it represents the point of view and procedure developed in their classes. The book is almost autobiographical, for it traces the changing ideas of geography over recent decades and includes photographs of many of the leaders. Many sections become quite philosophical, or "conceptual"—a word which appears frequently in the text but which is missing from the index. The graduate student will find much to discuss, but the treatment seems too heavy and wordy for freshmen. The volume represents a tremendous amount of work, with many ideas of value, but I doubt that it will become a widely used text.

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## Psychology

**Monozygotic Twins.** Brought up apart and brought up together. An investigation into the genetic and environmental causes of variation in personality. James Shields. Oxford University Press, New York, 1962. x + 264 pp. Illus. $11.50.

The study of twins can be regarded as a method of observing the outcome of a controlled experiment set up by nature. In this connection monozygotic twins have attracted special attention. Three American investigators, H. H. Newman (a biologist), F. N. Freeman (a psychologist), and K. J. Holzinger (a statistician) published a monograph [*Twins*, University of Chicago Press (1937)] based upon unique case material, 19 monozygotic twin pairs who had been brought up separately. These investigators developed a new method of expressing numerically intrapair similarities, which has been especially helpful in shedding light on the influences of environment on intellectual development. Monozygotic pairs brought up separately were compared with pairs, both monozygotic and dizygotic, brought up together.

James Shields, a British psychiatrist, got in touch with and secured the cooperation of two groups of twins, each composed of 44 monozygotic pairs; twins in one group, the S-group, had been separated early in life and those in the control group, the C-group, had been brought up together. The pairs in each of the groups were selected from 5000 twins who responded to an appeal Shields made on television. An elaborate procedure for establishing the zygosity of the twins was set up, the so-called similarity method. However, despite its usefulness, the number of times the twins in a pair were mistaken for one another was not employed as a criterion of zygosity. Monozygotic twins are incorrectly identified about 80 percent of the time by teachers and 25 percent of the time by parents.

The study is focused mainly on intrapair comparisons of intelligence and various personality traits, with special regard for the importance of certain environmental factors, such as social class and pattern of upbringing.

Shields had to overcome great administrative difficulties in collecting his data. He is well aware of the intricacies and sources of error in twin research. On the average, twins are one quarter of a standard deviation inferior to single-borns in intellectual achievements; this restricts the scope of the generalizations that can be based on findings derived from twin populations. Self-selection may be responsible for the surprising finding that intrapair similarities are of the same magnitude in the C-group as in the S-group. The sex factor may be another source of error, since we know that dizygotic twins of the same sex tend to be much more similar, at least in cognitive achievement, than twins of unlike sex. Finally, the wide age range may have introduced an uncontrolled factor that could have blurred the general picture, especially in the assessment of intellectual differences within pairs. Some previous studies suggest that there is a higher incidence of left-handedness among both monozygotic and dizygotic twins, and this has been explained by asymmetry reversal. Shields seems to accept this finding. But surveys of complete age groups of Swedish conscripts have failed to disclose any difference between twins and single-borns with respect to incidence of left-handedness or any differences between monozygotic and dizygotic twins with respect to concordance of handedness.

An extensive and valuable case history description, based upon clinical interviews, is given. Painstaking procedures are set up in order to establish the effect of early separation. New facets of the complicated interaction of genetic and environmental factors are given.

The author arrives at two general conclusions "for the truth of which there seems to be good support." (i) "Family environments can vary quite a lot without obscuring basic similarity in a pair of genetically identical twins." (ii) "Even monozygotic twins brought up together can differ quite widely." The validity of these statements depends in part on the importance of the sources of error indicated above. In any case, the study makes significant contributions to our knowledge in this field.

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## Newtonian Literature

**Isaac Newton, Historian.** Frank E. Manuel. Harvard University Press, Cambridge, Mass., 1963. xii + 328 pp. Illus. $7.50.

Manuel's study of Newton's historical writings, a unique addition to the corpus of Newtonian literature, is most welcome. Manuel is the first scholar to examine these papers who has been equipped to understand them in their context. He demonstrates that Newton proposed a radical foreshortening of ancient history; by pruning several centuries from the annals of Egypt, Assyria, and Greece, Newton sought to establish the leadership of the Hebrews in the development of civilization. An even more radical procedure underlay his conclusions. By a tenuous argument Newton claimed to locate the equinoxial points on the eve of the Trojan war; since he knew the rate of precession, he was then able to fix the date of the Trojan war and from that date the rest of ancient history. If the topic sounds remote to the 20th century, Newton's work was, as Manuel reveals, the object of acrimonious debate for more than 50 years following its publication. Even though the method and the system did not, in the end, prove to be contributions to historical knowledge, as the author freely acknowledges, a clear understanding of them reveals the considerable scope of Newton's erudition and adds a new di-