acquire greater force." Accordingly we are here and there treated to a useful hypothesis. For example, the fact that the first collaterals from the axon of a cortical projection neuron are directed back to the cortex means for Lugaro that neighbouring neurons are stimulated to participate in the action of the first neuron, and that the function of these particular collaterals is to diffuse stimuli.

The superficial layer of the cerebral cortex is regarded as associational in function, the middle layer as motor, and the deep layer as sensory. It appears that the very deepest layer of the cortex, the destruction of which gives rise to the remarkable syndrome known as dementia precox, is normally developed much more in man than in lower animals, even the highest apes. We note, by the way, that the author regards the neuroglia as an anti-toxic substance, since it reacts more than the true nervous tissue to toxic substances.

The author very properly decries, on the one hand, the superficial methods of examination of insane patients as practised in most asylums and, on the other, the systematic examination by a hundred or more tests employed by certain enthusiastic plodders. The first is desultory and can never advance the science of psychiatry one whit, while the second is unpractical. Kraepelin's methods meet with the professor's approval.

On p. 64 Lugaro expresses the view that the manifestations of insanity at times defy comparison with normal processes, but here we would accuse him of failing to see below the surface; a normal instinct may be compared with its distorted self in disease, and any normal mental function may fitly be compared with its absence where such absence constitutes a positive symptom.

The author's views respecting heredity are rather heterodox. He starts with the premiss that the tendency of heredity is to improve the race, and appears to conclude therefrom that heredity is an over-estimated factor in the causation of insanity. He has some difficulty in rejecting the possibility of acquired characteristics being transmitted but, after a long discussion of the matter, appears finally forced to do so.

Private asylums receive some severe criticism. These institutions in Italy are apparently in a parlous state; but many in England come well beneath the ban, and this part of the book should not be read in a pharisaical mood.

The work should be on the shelf of every pathologist and asylum physician; it is thoughtful, suggestive and well written. The translation also is excellent, but there are a few infinitives that might with advantage be unsplit when the next edition appears, as it undoubtedly will.

THE AUTOBIOGRAPHY OF N. S. SHALER.

The Autobiography of Nathaniel Southgate Shaler, with a Supplementary Memoir by his Wife. Pp. x + 482. (Boston and New York: Houghton Mifflin Company, 1909.) Price 16*s.* net.

THE keynote of this book is to be found in its final lines, written to Mrs. Shaler by Prof. G. H. Palmer:—

"How large your companionship with him was your words in this volume, and elsewhere, show. Happy woman to have been so blest, and happy we who were allowed to know you both!"

The book is the outcome of a personal relationship, which pervades it, but which does not obtrude upon the reader. We are spared the emotional and sometimes spiteful passages which are supposed in so many biographies to add vitality to the story of a married life. We gather instead a sense of peace, such as comes from long-continued good work, jointly and perseveringly performed. But we do not get to know Shaler through these pages as generations of Harvard students knew him. Prof. W. H. Hobbs, indeed, wrote two years ago:—

"It would be necessary to secure a composite of the memory picture of literally thousands of students in order adequately to present the characteristics of this truly remarkable man to one who had never known him."

It was the man himself, a fighter from his youth, vigorous, virile, yet painstaking in a high degree, that established his claim on others, rather than the work he did. Hence his autobiography, which ends in 1861, and the modestly entitled "supplementary memoir," which covers the remaining forty-five years of his life, will be read with most pleasure by those to whom passage after passage will recall some familiar trait, some habit, perhaps some manner of speech, impossible to set down in print.

As an account of a life spent in transition times, when the easy-going, slave-tended society of the south was about to organise itself for a strife of heroes, the autobiography leaves us somewhat cold. We have useful glimpses, however, of Louis Agassiz, then dominating the natural science course at Harvard, and the anecdotes of his methods as a curator and an examiner (pp. 93–104, and 189–92) will please those called to similar duties. Young Shaler, studying fishes under his care, was left to describe what he could observe for himself, and was merely told when he was wrong; whereupon he would begin again, and so on, until his master found that the results tallied with his own. The impression made by Agassiz in denouncing the Darwin-Wallace school is well shown by the story of his pupil Stimpson (p. 129), who, when convinced that he had found intermediate links among molluscan species, ground "one of these vexatious shapes" to powder with his heel, remarking, "That's the proper way to serve a damned transitional form."

Shaler, of course, soon accepted the new views. He studied zoology practically, by dredging, fishing, and shooting, though he much disliked killing animals; and he was thus engaged, in his twentieth year, when the men of his native State, Kentucky, had to decide for or against the Union. The movement in the south was regarded as desultory; even if it continued, it was not going to reach Kentucky for some years; and Shaler set off with Hyatt in 1861 for a sail of several months about the mouth of the St. Lawrence. This peaceful campaign, with its scientific aims, involving a rough-and-tumble life on a small boat, prepared him for many a future struggle.

Shaler returned from it to find even neutral Kentucky divided within itself; and soon, though the chief actor tells us nothing of it, "Shaler's battery" became known upon the Union side.

Shaler married in 1862; but his wife refers us to his various writings on the war, and quotes very little from letters written to her from the field. The advance of Rosecrans on Nashville left Kentucky outside the crash of armies, and no echo reaches us of the bitter days round Chattanooga. It is of far more importance to Mrs. Shaler to record—and this was probably the feeling of all who knew her husband—that in 1864 Shaler was appointed assistant in palæontology in Harvard University. In 1869 he became professor of this subject, when only twenty-eight; then he was made professor of geology; and in 1891 he was chosen as Dean of the Lawrence Scientific School. Even his position from 1874 to 1880 as Director of the Geological Survey of Kentucky did not break his connection with the development of Harvard. For more than forty years, down to his death in 1906, he was one of the most familiar figures in the courts of the university.

Chapter xix., which deals with a visit to England, contains characteristic mention of Tyndall, and of several English geologists. Here, as in other places, some proper names have gone astray. The Rev. Mr. Simons of p. 256—have we not made the same rural journey to enjoy a meeting at his gate?—must surely be the late W. S. Symonds, the friend of all naturalists in the Midlands. Elsewhere we have "Renivier," "Guinitz," "Geoffrys" for Jeffreys, and "Marais," as we may presume, for "Marey." These slips result from copying out of diaries, where the incidents of the day have been set down. The incidents thus recorded, page after page, seem rarely of value in themselves; yet it is clear that we may end this notice much as we began. To those for whom the book is written, those whom Shaler had helped or stood by as a friend, nothing about Shaler will seem unworthy to be expressed.

GRENVILLE A. J. COLE.

MATHEMATICAL TEXT-BOOKS.

(1) *Geometry for Beginners.* By C. Godfrey and A. W. Siddons. Pp. x+79. (Cambridge: University Press, 1909.) Price 1*s*.

(2) *The School Geometry.* Parts i. and ii. By W. P. Workman and A. G. Cracknell. Part i., pp. viii+248. Part ii., pp. viii+(233–383). (Cambridge: University Tutorial Press, Ltd., 1909.) Price 2*s*. each part.

(3) *Coordinate Geometry.* By H. B. Fine and H. D. Thompson. Pp. viii+300. (London: Macmillan and Co., Ltd., 1909.) Price 6*s*. 6*d*. net.

(4) *Exercise Papers in Elementary Algebra.* By the Rev. E. M. Radford. Pp. viii+112. (London: J. M. Dent and Co., 1909.)

(5) *Problem Papers in Mathematics.* By R. C. Fawdry. Pp. vii+240. (London: Macmillan and Co., Ltd., 1909.) Price 4*s*. 6*d*.

(1) IN the light of the experience gained in the last eight years or more, it is now possible to estimate, with considerable accuracy, the effect of the numerous changes which have been made in the methods of teaching elementary geometry. The circular issued by the Board of Education last March contains a report on this subject which is well worth careful perusal. The central feature of the modern movement has been an attempt to familiarise the pupil with the fundamental concepts by experimental methods, before providing him with formal proofs. It is now suggested that this experimental stage, by being made more systematic, should *replace* the first part of the present deductive course. The properties of parallel lines and congruent triangles possess a characteristic which pertains to few, if any, of the later theorems. Once a pupil clearly apprehends their significance, which is possible only by experimental work, he is convinced with absolute assurance of their truth; and this very fact only serves to increase the difficulties which surround the formal proof. In the words of the circular,

"to commence the subject by proving what seems to need no proof is a safe way to make boys think that the whole subject is artificial and unreal. It is much better to begin Euclidean, that is, deductive proofs at the point where their necessity can be appreciated—that is after these fundamental propositions—and where, therefore, the proof is a natural process, not subject to arbitrary or artificial rules."

If then these base-theorems are incorporated in the experimental stage, and if at the end of this course those fundamental concepts, which have been thereby assimilated, are allowed to be assumed without formal proof, the course of deductive geometry will open with the properties of areas of triangles and parallelograms, and continue with theorems on the circle. In this way, at the end of his first year, a pupil will have covered as much ground as at present is covered, in the majority of cases, only after two or three years.

The present excellent little volume has been compiled to cover the complete experimental course outlined above, and it follows in every respect, save one, the suggestions made by the Board of Education. It is, however, advised in the circular that riders should be excluded entirely from the experimental stage; although in this way time may be saved and greater emphasis placed upon the fundamental theorems, yet simple riders so frequently serve to illustrate a theorem, and, moreover, form a valuable introduction to the future deductive course, that we are firmly convinced that the authors are right in inserting a large number of easy deductive examples in the text. We have developed these considerations at some length, because we consider that the change now advocated is likely to exert a profound influence on the teaching of geometry, and that the more it is considered in all its bearings, the more advantageous it will appear.

(2) This is an abridged edition of the authors' work, entitled "Geometry: Theoretical and Practical," published about two years ago. In the present book a certain amount of theory which may be fairly considered to be beyond the range of the average schoolboy has been omitted. The sequence adopted in the theoretical course is that of the Cambridge syllabus. Part i. contains the substance of Euclid books i., iii.; part ii. that of books ii., iv., vi., together with those