mind that plays so prominent a *rôle* in the science of this century. Beginning his career as a physiologist, he soon saw in the pursuit of his specialty the opportunity of bridging over the gap between body and mind, or, better, of restoring to its original unity the study of the two as different aspects of one phenomenon. The field of physiological psychology had been simply touched upon here and there. It lacked systematic treatment as well as recognition as a distinct science. Both of these he attempted to supply; and the attempt, considering the inherent difficulty of the subject, has been eminently successful. He published the first systematic text-book in this field in 1874, a second and much enlarged edition appeared in 1880, and the third has just appeared. In these thirteen years the growth of the science has been rapid, and the fact that the validity of this increase is in great part not yet tested makes it necessary to record much that our successors will be able to omit. But independently of this technical aspect of the study, science owes a debt to this movement similar to that it owes to Darwin. The one introduced the same rejuvenating ferment into the discussion of philosophical problems as has the other into that of biological problems. It has given meaning to facts formerly isolated and uninterpreted, has erected a sign-post directing the way for the future, and has prevented much useless and irrelevant speculation. It is to be hoped that the objects and methods of this science are to-day too well known to need more than a mention in this connection.

The question of most natural interest in the notice of this text-book is the extent and nature of the changes that have been made in passing from the second to the third edition. While the author has made alterations in all parts of the work, the topics that have been most altered are the following, and they indicate very well the fields in which recent research has been active. The anatomy and physiology of the central nervous system, and particularly of the parts connected with the highest psychic activities, have been much revised. Next, the experimental study of sensation, both qualitatively and quantitatively, has received valuable additions from many hands. The chapter on auditory perceptions has been rewritten, and that describing the measurement of the times of psychic processes has been made to include the most recent studies, especially those made in Professor Wundt's own laboratory. Whether these changes justify the publication of a new edition is a question upon which opinions will differ. A great deal of what has been added has been already published in the *Philosophische Studien*, edited by Professor Wundt; and, as most of this material is only of technical interest, its incorporation into a text-book is hardly an advisable step. Again, the advance in the knowledge of facts has brought with it an advance in the presentation of theoretical views, and Professor Wundt has hardly undertaken the radical kind of revision that the appreciation of these would justify: in other words, if a text-book in physics were written upon the plan of this work, it would amount to a cyclopædia, and the reader of that cyclopædia would be at a loss to distinguish the important and clearly established from the unessential and provisional. The book has grown thicker where it should have grown deeper. Finally, at the risk of singling out a trivial matter, an American reader is very much struck with the absence of all mention of the studies that have been contributed to this science on this side of the Atlantic within the last few years. These studies to a large extent fall in those chapters that have been most fully revised; and this, together with the fact that they have been noticed in Professor Ladd's 'Psychology,' makes the cause of this omission all the more strange.

Spezial Karte von Afrika. Gotha, Justus Perthes. f°.

THE second edition of this valuable work on African geography is now complete. It consists of ten sheets, and contains all the new discoveries made during the last years. The coloring of the new edition is more delicate than that of the first edition, and the political boundaries have been indicated in colors that do not obscure the physical features of the country. The map is carefully compiled from all the available material, and is indispensable to the student of African geography. Although it is only a year since the first edition was completed, the additions to our knowledge of some parts of Africa are so considerable that the sheets had to be practically redrawn. On the sheet Kongo we find the results of Capello and Ivens's journey, Reichard's journeys west of the Tanganyika, and the numerous explorations on the tributaries of the Kongo. The contour line of 1,000 metres, which was indicated by a heavy buff line in the first edition, has been corrected according to recent observations, and is shown by a broken red line. Another technical improvement of the new edition is the use of a dark green color for indicating oases. On the sheet Western Sudan we find A. Krause's important journey through Mosi indicated, although the details are not yet known. The leading principles in constructing the map are thoroughly scientific. The lettering and the outlines show plainly the parts that are known by exploration, and those which are only known by reports of natives. The scale is 1:4,000,000 (about 60 miles to an inch), large enough to show all important features of the geography of Africa.

The Driftless Area of the Upper Mississippi. By T. C. CHAMBERLIN and R. D. SALISBURY. (A monograph accompanying the Sixth Annual Report of the Director of the United States Geological Survey.) Washington, Government. 4°.

IN no direction is the Geological Survey advancing the science more rapidly than in the department of glaciology. The monograph on the great terminal moraine has done more than any other single research to make the continental ice-cap a reality, and to silence the iceberg theory of the drift; and the present contribution is scarcely less valuable or wide-reaching in its conclusions.

In the midst of the great mantle of drift that overspreads the Upper Mississippi basin, there lies a drift-barren tract of about ten thousand square miles, — the driftless area of Wisconsin and adjoining States. This island in the sea of drift is unique; and, strangely enough, the margin of the drift on almost every hand lies on a slope descending toward the driftless area. Probably no other district on the globe is so favorably situated to serve as a standard of comparison and contrast between glaciated and unglaciated areas, and a means of estimating the results of the drift agencies. All of the formations of that region, with their attendant topographies, sweep curvingly across the driftless area from an ice-ridden region on the one hand, to a like ice-ridden region on the other, displaying in a most striking manner the contrasts that arose from the single factor of glaciation. The driftless region is especially instructive concerning glacial extension and restriction, and it throws important light upon the movements of the ice-sheet over a very large adjacent territory. The great drift-burdened ice-stream, as it moved south-westward from the Canadian heights, was divided and diverted; and the separated currents swept around the area, and mingled their burdens below it.

The facts bearing upon these and many minor aspects of the driftless area are marshalled and discussed in a masterly manner, the more important features being also clearly exhibited in a series of well-executed maps and cuts. Among the subordinate contrasts which this region presents, none are more noticeable than the absence of falls in the driftless area, and their comparative abundance beyond its limits, — falls indicating a youthful, and usually a post-glacial, topography. And certainly there could be no more convincing evidence that the region has never been invaded by glaciers than is to be found in the fragile pinnacles of rock which abound over a large part of its surface.

The residuary earths of the driftless area are compared physically, microscopically, and chemically with the glacial clay or till. Nearly one million measurements of the ultimate particles show that the residuary earths are much finer grained and more homogeneous than the drift clay; and they are also remarkably free from calcareous matter, which forms a large proportion of all the true drift of that region.

In its remarkably sinuous course across the continent, the great terminal moraine impinges upon the eastern side of the driftless area, and affords specially fine contrasts between the characteristics of driftless and drift-bearing regions; while upon the west it is bordered by the loess; and the much-disputed question as to the origin of this interesting formation is settled provisionally in favor of its being essentially an aqueous or lacustrine deposit of glacial clays.

In the concluding chapter, on the history and genesis of the drift-

less area, it is shown more clearly that the marginal phenomena confirm Professor Chamberlin's previously published classification of the quaternary epochs. He recognizes (1) an earlier glacial epoch, in which two successive ice-sheets were separated by an interglacial period sufficiently marked to permit the growth of vegetation over the surface; (2) a prolonged interglacial epoch, during which the land was elevated to the extent of eight hundred to one thousand feet, and again forest-clad; (3) a later glacial epoch, during which the great terminal moraine was formed, while subordinate moraines and vegetal deposits testify to repeated recessions and advances of the ice; (4) the Champlain epoch, during which marine and lacustrine deposits were formed; (5) the terrace epoch, when the streams carved the flood-plains of the Champlain epoch into terraces.

The origin of the driftless area is found in the fact that the elevated land lying north-east of it must have acted as a wedge to divide the ice, while the diverging troughs of Lake Superior and Lake Michigan tended to prevent the streams from re-uniting immediately south of the obstruction. Climatic influences also probably played an important part in staying the progress of the ice which was advancing directly toward the driftless area. In the language of the authors, diverted by highlands, led away by valleys, consumed by wastage where weak, self-perpetuated where strong, the fingers of the *mer de glace* closed around the ancient Jardin of the Upper Mississippi valley, but failed to close upon it.

A History of Elizabethan Literature. By GEORGE SAINTSBURY. New York, Macmillan. 12°. $1.75.

THIS book forms the second part of a general history of English literature from the earliest period to the present day. The whole work will be completed in four volumes, by four different writers, each specially qualified for his individual task. Mr. Saintsbury has been for many years an enthusiastic student of the period of which he treats, and he here gives the main results of his studies in a clear and well-ordered form. He wisely confines himself in the main to the purely literary aspects of his subject, with much less attention to biography and bibliography than some writers would give. He allows considerable space to the minor writers, a knowledge of whom he thinks essential to a correct understanding of the period. His enthusiasm for his subject is almost unbounded, and some readers will think it excessive. He styles the Elizabethan era "the greatest period in the greatest literature of the world," and seems too little aware of its defects. His admiration for Shakspeare is carried to the verge of idolatry, and he does not appear to see any faults at all in him.

Spenser he esteems almost as highly, and thinks the 'Faërie Queen' the greatest poem in the English language. With regard to the forms of poetry, he maintains that "every English metre since Chaucer at least can be scanned, within the proper limits, according to the strictest rules of classical prosody," — an opinion with which very few persons will agree. The greater part of the book is of course devoted to the writers of verse, yet the prose writers are treated with sufficient fulness. Bacon, in Mr. Saintsbury's opinion, was more of a rhetorician than a philosopher, and might better have gone into the Church than into politics. Hobbes is spoken of as the first prose writer whose style is clear and uninvolved; while the general style of the period is well characterized in the remark, that at that time "the sense of proportion and order in prose composition was not born." Mr. Saintsbury's work, notwithstanding some defects, will be valuable both to the student and to the general reader; and, if the other volumes of the series are equally well done, the whole work will be the standard history of English literature.

Hegel's Philosophy of the State and of History. By GEORGE S. MORRIS. Chicago, Griggs & Co. 16°.

THIS book is the sixth in the series of philosophical classics now in course of publication under the editorial supervision of Professor Morris. It gives in a brief, by no means superficial form the theories of Hegel on the constitution of the state and of civil society, and also on the philosophy of history. Hegel's terminology is so strange to the English reader, and his processes of thought often so obscure, that it is not an easy task to make his meaning plain and comprehensible, but Professor Morris has succeeded in doing this as well as could be expected. The theory of the state which the German philosopher has given is not in all respects such as the people of a free country are likely to accept. He repudiates the intention of describing an ideal state, such as Plato and others have dreamed of, and he has little respect, apparently, for such attempts on the part of others; yet it is not difficult to see that a constitutional monarchy is in his eyes, if not an ideal state, at least the most perfect type that has yet been devised. He divides the powers of government into three classes, — the legislative power, the executive power, and the power of ultimate decision, which properly resides in the monarch alone. He is strongly in favor of a representative assembly to take part in legislation, but he regards with great distrust the influence of public opinion, which is the inevitable consequence of representation. On the subject of war, Hegel is not in accord with the peacemakers, his view being that "war is to nations what wind is to the sea, — it preserves them from stagnation and putrescence."

On the subject of history the views of Hegel are in some respects a little behind the age, owing partly to the new theories of development which now prevail, and partly to the discovery and interpretation since his time of the ancient records of Egypt and Assyria. Still his theories are well worth pondering. He holds that history as a whole is "the development of the conception of freedom," — a remark that seems to apply rather too exclusively to mere political history. He passes in review the history of the leading nations, briefly characterizing the civilization of each, and showing the connection of them all with the life of modern Europe. In the course of this exposition he has many interesting observations on special points which we should be glad to quote if space permitted, but we must content ourselves with recommending our readers to look them out for themselves.

NOTES AND NEWS.

IN compliance with what seems to be a wide-spread desire on the part of the geologists of America, a few have united in an effort to establish an American journal devoted to geology and its allied sciences. The subscription price is three dollars per year, and the place of issue for the present is Minneapolis, Minn., where correspondence should be addressed to *The American Geologist*. From all geologists the editors solicit original contributions and items of scientific news. The editors and publishers, for the year beginning Jan. 1, 1888, are as follows: Prof. S. Calvin, Iowa City, Io.; Prof. E. W. Claypole, Akron, O.; Dr. Persifor Frazer, Philadelphia, Penn.; Prof. L. E. Hicks, Lincoln, Neb.; Mr. E. O. Ulrich, Newport, Ky.; Dr. A. Winchell, Ann Arbor, Mich.; Prof. N. H. Winchell, Minneapolis, Minn.

— A company has been incorporated for building a railroad from Winnipeg to Fort Simpson, British Columbia, crossing the Rocky Mountains by way of the Peace River Pass. This is one of the routes surveyed by the Canadian Pacific Railroad. It was recommended, as the distance from Fort Simpson to eastern Asia is still shorter than that from Vancouver. Part of the country through which this road would pass is suitable for agricultural purposes. The charter compels the incorporation to build at least fifty miles each year, the whole distance being a little more than sixteen hundred miles.

— The second number of the bibliographies of Indian languages by James C. Pilling has just been issued by the Bureau of Ethnology. It treats of the Siouan stock. The plan of this bibliography is the same as the one followed in the 'Bibliography of the Eskimo Language,' which was referred to in No. 235 of *Science*. The dictionary plan has been followed to its extreme limit, the subject and tribal indexes, references to libraries, etc., being included in one alphabetic series. The arrangement is excellent, and makes the bibliography very handy for use.

— The Pennsylvania State College Agricultural Experiment Station was established by vote of the trustees June 30, 1887, in accordance with the provisions of the Hatch act, and will continue and greatly enlarge the experimental work of past years. It investigates such subjects as are of immediate importance to the farmer of the State, and publishes the results in reports and bulletins, which are distrib-