other mammals, enables training of a progressive nature in succeeding generations, and whether this lengthened immaturity is a result, or cause, or both, it is a great advantage. We may be justified in regarding the immaturity as prolonged beyond that of other mammals rather than that man's longevity is proportionately less.

S. V. CLEVENGER.
Chicago, Ill.

BOOK-REVIEWS.

Handbook of Australian Fungi. By M. C. COOKE. London, 1892. 458 p. 36 pl.

Select Extra-Tropical Plants, Readily Eligible for Industrial Culture or Naturalization. By BARON FERD. VON MUELLER. 8th Edition. Melbourne, 1891. 595 p.

HE who nowadays would keep posted in regard to the progress of science must frequently turn to the southern hemisphere. In South America, in South Africa, and in Australia the devotees of science have been and are working. The recent organization of an Australasian Association for the Advancement of Science is an effort toward a union of scientific men such as already exists in North America, England, France, and Germany; and it will do much toward unifying the work of the numerous scientific bodies that have long existed in the various colonies. The vast extent of territory and the distances between the capitals of the several colonies is paralled only by our own country, but here we have the advantage of a greater net-work of railways and more rapid means of communication. From Hobart, the capital of Tasmania, to Christchurch, New Zealand, where the meeting of the Association was held in 1891, the distance is about 1,000 miles. From Sydney, in New South Wales, it is over 1,200 miles; from Adelaide, in South Australia, the distance is over 2,000 miles; while it is even further than this from Brisbane, in Queensland. All of these places are included in the comprehensive Australasian Association.

To enumerate the scientific societies in Australia would require considerable space. We cannot, however, forbear alluding to some of the more important, as shown by their publications. There is, for example, the Royal Society of New South Wales, that has issued 24 volumes of proceedings; the Royal Society of Victoria, and the New Zealand Institute, also each with 24 volumes; the Linnæan Society of New South Wales, with 6 volumes; the Australasian Association for the Advancement of Science, 3 volumes, and the Royal Society of Tasmania, that has been publishing since 1863. Besides these there are innumerable irrigation, engineering, mining, and geological reports published by the governments of the several colonies. The agricultural side is represented by reports of the secretaries for agriculture of Queensland, New South Wales, etc., and by the grand publications of Mueller on the Eucalypts, and the well-edited agricultural journal of New South Wales. To mention all the official publications would be a task too great to be undertaken here. But from what has already been said, it must be manifest that the Australian colonies are not one whit behind the rest of the civilized world in their contributions to scientific and practical literature.

There is, of course, a reason for this activity. The country is new, and is full of wonderful birds and animals and plants; and the men who left behind them in Europe an exhausted field, as far as novelties in science go, find in the colonies a virgin field. The vegetation, the animal life is so different from that of the northern hemisphere that we may look forward for years to come for additions to our knowledge of the productions of the wonderful island.

Two books that have lately been added to botanical literature from Australia are those mentioned at the head of this article. Both are from veterans in their respective fields, one a cryptogamist, the other a phanerogamist. Both have a world-wide reputation, and both have exceeded the three-score and ten years of allotted human life and are yet active workers. Although here brought into conjunction, the men themselves are residents of opposite sides of the globe. The names of Dr. M. C. Cooke and Baron Ferd. von Mueller must live as long as the science of botany exists. Students of science are grateful that they have been spared long enough to give them two such valuable works.

The "Handbook of Australian Fungi" is a compilation of the descriptions of these plants that have at various times been published in widely-scattered volumes. The work was undertaken at the request of the Australian colonies, and is published under their authority. A limited edition only has been printed, some 500 copies, and the major part of it has gone to Australia. The total number of species given in the volume is 2,087, exclusive of varieties. This, in comparison with the total number of species recorded by Saccardo, some 36,000, seems small when the extent of country covered is considered. But it is of course very improbable that all the Australasian forms have been described. Indeed, scarcely a month passes but some new forms are recorded, and it is probable that they will continue to be sent in for many years to come.

The largest order represented is Hymenomycetes, with 1,178 species, more than half the total number recorded. This is probably due to the fact that the species are large, or at least conspicuous, and are therefore collected. Another order, however, also with conspicuous members, the Gastromycetes, is exceptionally well represented, as there are 174 species out of a total known from the whole world of 650 species. Among the interesting species of this family we note *Podaxis indica*, a plant bearing a surprising outward resemblance to *Coprinus cornatus*, but of course with a very distinct internal structure. There is also *Xylopodium ochroleucum*, with a long stalk and a peridium marked with numerous angular projections.

The occurrence of a number of species in the two islands of Ceylon and Australia is noted as a curious fact in geographical distribution. The flora in general and the fauna as a whole is so distinct in these two countries that it is difficult to account for this fact. It is true that plants in many cases seem to overstep the bounds that have been assigned to them by botanists, and do not appear to follow the ordinary laws of distribution. Especially is this true of ferns and fungi, two classes having spores so minute as to be capable of transportation long distances through the air by winds. Some species thus become cosmopolitan, but at present we cannot account for finding some species of such conspicuous genera as *Lepiota*, *Hymenochæte*, *Stereum aserõe*, etc., *only* in Ceylon and Australia. It is of course possible that when the intervening islands of New Guinea, Java, Borneo, Celebes, Sumatra, and other smaller ones of the Malay archipelago are explored, that the same species may be found there. That would do away with the anomaly. Comparing the flora with that of Europe, Dr. Cooke finds that 332 of the Hymenomycetes are exclusively Australian, 472 are also found in Europe, and 370 are common to Australia and some other country. Of the Gastromycetes only 31 out of 173 species are European.

In the introduction Dr. Cooke gives condensed accounts of the principal groups, with tables of the genera. This, while not claimed to be complete in any sense, cannot but be of assistance to the student. The species will have to be identified from the descriptions. This is to some extent facilitated by the plates. Of the 36, 20 are colored, and on them are given 377 figures. A list of the authorities cited, and a full index are valuable portions of the book. The descriptions of the plates would have been more convenient for reference had the page where each species is described been given.

The second one of our titles is a new edition of an old book, but it is such a valuable book that it deserves to have general attention called to it. The early editions being exhausted, and there being much new matter in hand, the government of Victoria publishes this volume. To give an adequate idea of its contents would be to index it. We can only refer in a general way to its contents and perhaps mention a few of the more important and interesting facts presented. We have also been struck with Baron Mueller's remarks in both preface and postscript. In the former, after reviewing in a general way the contents of the volume, and mentioning the various editions of it that have appeared from time to time, he says:—

"The fact that this work through successive editions and ex-

tensive issues came into use over a large portion of the world, whether for educational, or rural, or journalistic, or touristic wants, has been most gratifying to the author; but this brightness is dimmed by the circumstance that the book has not unfrequently been used even in public departments with perhaps unintentional evasion of all literary or any other acknowledgment. Nor did hardly ever words of appreciation reach the author from wherever rural successes were gained from even practical exertions of the author."

This is too often the experience of the literary and scientific man. His ideas, his knowledge, are seized upon, or his books and papers are received and no hint of the benefits he has conferred ever reaches his ears; no indication is ever apparent that the seed has fallen upon fertile ground. In his postscript the author requests persons using the book to send him suggestions or additions, concluding with the following words:—

"While approaching the eighth decade of his life, the author cannot hope to see many more editions of this work, brought up to the newest standard, through the press himself; but, as he may perhaps still be able to publish one more edition before passing away, he is now particularly eager that the next issue should by some special efforts be rendered as complete as this, within the knowledge of the present days, can be accomplished. Such help, furthermore, would really be a recompense only from those who in using this book derived some practical benefit or instructive advantages from its pages."

The number of practical suggestions is endless. For example, in speaking of the "Black Wattle" of Australia, mention is made of the great value of the bark for tanning purposes. One and one-half pounds of this will do as much as five pounds of English oak bark. The tree is easily grown, and the seeds may be sown broadcast or in drills. It grows on the poorest and dryest soil, and a return may be expected in from five to ten years. Full-grown trees yield about 100 pounds of bark. It grows about an inch in diameter annually, and is hardier than *Eucalyptus globulus* (the gum tree). On this account it would be valuable to introduce into our Southern States and Southern California. The seeds retain their vitality for several years, and can be obtained in Melbourne for 5 shillings per pound, each pound containing from 30,000 to 50,000 grains. They germinate best after being soaked in warm water.

The "rain-tree" is described as reaching a height of 70 feet, with branches extending 150 feet away from the trunk. It grows rapidly and makes an admirable shade-tree in countries where there is no frost, and where the rainfall fluctuates between thirty and sixty inches annually. The leaves shut up at night and allow rain and dew to reach the ground beneath, so that grass will grow. The pods are produced in great abundance, and are fattening to cattle, which feed upon them greedily.

The tea-plant is stated to be hardy near Melbourne, enduring light frosts and scorching hot summer winds. It thrives best, however, in humid valleys with rich alluvial soil, where there are springs for irrigation. The greater the rainfall the larger the yield of tea. In Japan the plant is cultivated as far north as 43° latitude, where the thermometer occasionally falls to 16° F., and the ground remains frozen several inches deep for weeks. In 1840 India sent her first sample of tea to European markets, and in 1864 exported 7,800,000 pounds. In 1889 the amount had risen to 101,000,000 pounds. Three hundred pounds to the acre is the average yield in India. The author believes that for many years to come it will be a profitable business to raise tea-plants for the seeds alone.

Some twenty-five pages are devoted to the *Eucalyptus*, full accounts being given of several of the species. The "giant gum tree" (*Eucalyptus amygdalina*) reaches a height of 415 feet. The tree sometimes measures 69 feet in circumference at the ground, and one has been recorded as 33 feet in diameter at 4 feet from the ground. One 78 feet from the ground was 9 feet in diameter.

CALENDAR OF SOCIETIES.

Philosophical Society, Washington.

Jan. 21.—T. C. Mendenhall, The Use of Planes and Knife-Edges in Pendulums; R. S. Woodward, The Use of Long Steel Tapes for Measuring Base Lines. A report will be presented from the committee appointed to consider suitable commemoration exercises at the 400th meeting of the society.

Agassiz Scientific Society, Corvallis, Ore.

Jan. 11.—G. W. Shaw, Gravitation a Form of Energy.

Publications Received at Editor's Office.

A FREE LAND. The Cry of the Children. London, Williams & Norgate. 123 p. 12°.

BECKER, G. F. Finite Homogeneous Strain, Flow and Rupture of Roc s. Rochester, N. Y., Geol. Soc. Amer. 8°.

BOYD, R. NELSON. Coal Pits and Pitmen. New York, Macmillan & Co. 256 p. 12°. $1.

CARUS, P. Truth in Fiction. Chicago, OpenCourt Pub. Co. 111 p. 8°. $1.

CONGRES INTERNATIONAL DES AMERICANISTES. Compte-rendu de la Nuitième Session. Paris, Ernest Leroux. 704 p., pl. 8°.

DUMBLE, E. T. Report on Brown Coal and Lignite of Texas. Austin, Tex., Geolog. Survey. 243 p., pl. 8°.

FOSTER, L. S. The Published Writings of George Newbold Lawrence, 1844–1891. Washington, Smithsonian Inst. 124 p. 8°

LODGE, Oliver. Pioneers of Science. London and New York, Macmillan. 404 p. 12°. $2.50.

MACDONALD, A. Criminology. Introduction by Dr. C. Lombroso. New York, Funk & Wagnalls Co. 416 p. 12°

SIMMONS, H. M. The Unending Genesis. Chicago, C. H. Kerr & Co. 111 p. 24°. 25 cents

TALMAGE, J. E. Domestic Science. Second Edition. Salt Lake City, Utah, G. Q. Cannon & Sons Co. 389 p. 12°.

THE JOURNAL OF POLITICAL ECONOMY. Vol. I., No. 1. Dec., 1892. Chicago, The University Press. 161 p. 8°. $3 per year.

WORLD'S FAIR ELECTRICAL ENGINEERING. An Illustrated Monthly Magazine. Chicago, Elec. Eng. Pub. Co. 56 p. 8°. $3 per year.

It grows with great rapidity, in France reaching a height of 50 feet in 8 years. It is hardy in the milder parts of England. It yields a valuable volatile oil, and it is said when combined with thymol and other antiseptics to be efficacious in treatment of scarlet fever and other infectious diseases, especially as an external application. Fresh branches placed under the bed of phthisic patients act as an antiseptic, a sedative, and a hypnotic. The plant is also useful in subduing malarial effluvia in fever districts.

We cannot go further into details, but commend the volume to all botanists and horticulturists. Various indexes, of trees best adapted for certain purposes, of genera referred to, of synonyms, of vernacular names and of species best adapted to various regions of the globe, add greatly to the value. The price of the book is only five shillings.

JOSEPH F. JAMES.

Washington, D.C., Jan. 12.

A Text-Book of Least Squares. By MANSFIELD MERRIMAN. 6th Ed. New York, J. Wiley & Sons. 1892. 198 p. 8°.

Theory of Errors and Method of Least Squares. By W. W. JOHNSON. New York, J. Wiley & Sons. 1892. 174 p. 12°.

WE have here two excellent works, written by two able men, and illustrating in an interesting manner those different views of identical principles and methods which independent thinkers are always able to exhibit, however old and well-worked the subject. Professor Merriman wrote his first edition of this treatise in 1877, with the purpose of presenting the facts and principles of this somewhat abstruse subject in such form as to make them easily comprehended by students and by engineers, in practice often less familiar than the student with work underlying the higher mathematics. That treatise, while successful, served nevertheless, to indicate where still further improvement might be effected, and the present is a re-written treatise, of which the major portion was prepared and printed in 1884, as a second edition. The sixth edition, now before us, contains the same matter in substance, but with the usual and unavoidable printers' and other errors, always found in first issues, removed, and some improvements introduced in the treatment of adjustments of two related quantities, and with notes of interest appended. The book has become a standard work of reference, as well as a text-book, and needs no special commendation from us, other than the expression of full agreement with the verdict of the purchasers and users of five issues, who have made necessary this sixth edition.

Professor Johnson has condensed his work into a smaller compass than the preceding; but it is all the more rich and "meaty." The author follows Gauss in the methods laid down in "Theoria Motus Corporum Cœlestium" (Werke, VII.), and treats the "reduced observation equations" by the more explicit methods introduced by Jordan ("Handbuch der Vermessungskunde," 1888) and later writers, including Oppolzer, to whom he goes for some of the more important forms adopted in computations. The book is systematic, logical in its sequence, and well illustrated by carefully chosen examples in application. Appended are tables of values of the probability-integral and of powers and roots.

When a mathematician of eminence undertakes thus to provide a treatise upon a subject of importance, and compiles a text-book, for young students, not only the youth who is thus provided with a text-book but the whole world of observers employing such methods become more indebted to him than to the less distinguished and less talented man doing similar work; we have the assurance, not only that the book will serve its purpose, but that it represents the latest and best thought and labor of the time. This assurance is worth much to teacher and pupil; and it can hardly be doubted that the use of this little treatise will extend beyond the limits of the United States Naval Academy, where it was originally intended by its author to be used, in his own classes.

Exchanges.

[Free of charge to all, if of satisfactory character. Address N. D. C. Hodges, 874 Broadway, New York.]

For sale or exchange.—I have a few copies of my translation of "Strasburger's Manual of Vegetable Histology, 1887," now out of print, which I will send post-paid for $3 or for one dozen good slides illustrating plant or animal structure. Address A. B. Hervey, St. Lawrence University, Canton, N. Y.

The undersigned has the following specimens to exchange for crystals of any eastern or foreign localities or Indian relics: tin ore, metacinnabarite, stibnite, garnierite, calenanite, hanksite, ulexite, rubellite, lepidolite, blue and green onyx, Cal. pinite, aragonite on chalcedony, cinnabar, double refracting spar, clear and clouded, and others. J. R. Bush, care of General Delivery, Los Angeles, Cal.

For sale or exchange.—A private cabinet of about 200 species of fossils, well distributed geologically and geographically. Silurian, about 40; Devonian, about 50; Carboniferous, about 80; others, about 30. Frank S. Aby, State University, Iowa City, Ia.

For exchange.—Minerals, fossils, F. W. shells, land shells, native woods, Indian relics, two vols. of Smithsonian reports, odd numbers of scientific magazines, copper cents, etc., for good minerals not in my collection, good arrow- and spear-heads and natural history specimens of all kinds. Correspondence solicited with list of duplicates. G. E. Wells, Manhattan, Kan.

For sale or suitable exchange.—A spectrometer made by Fauth & Co., Washington, D. C., according to the plan of Prof. C. A. Young. This instrument is suitable for the most advanced investigations and determinations. Cost originally $700 and has been used but little. Will be disposed of at a considerable reduction. Address Department of Physics, Ohio University, Athens, O.

I will send British land and fresh-water shells in return for those of America, any part, sent to me. I have at present about fifty or sixty species, with many varieties. W. A. Gain, Tuxford, Newark, England.

The Biological Department of Hamline University desires to offer microscopic slides of animal tissues, or whole animals, in exchange for first-class fossils. Address correspondence to Henry L. Osborne, Hamline University, Hamline, Minn.

Kindly mention "Science" in writing to Advertisers.

Wants.

WANTED.—American Journal of Conchology, seven volumes. Parties having these for sale will please address the undersigned, stating condition and price. R. Ellsworth Call, Louisville, Ky.

A GRADUATE ENGINEER will give instruction evenings in geometry, trigonometry and surveying, mechanics, physics, mechanical drawing and general engineering construction. Five years' experience in field and editorial work on engineering journal. References furnished. C. S. H., 102 Tribune Building, New York.

WANTED.—By well-qualified and experienced science master and associate of the Royal School of Mines, London, aged 26 (at present in England), a mastership in technical college or university for any of the following subjects: Engineering sciences, geology and mineralogy, physics, chemistry and metallurgy, etc., etc. Can provide excellent references and credentials. Apply, J. G., 17 Sussex St., Rochdale, England.

A GRADUATE of the University of Pennsylvania and a practical mineralogist of twenty years' experience desires to give his services and a cabinet of 25,000 specimens, all named, with about the same number of duplicates, in minerals, crystals, rocks, gems, fossils, shells, archæological and ethnological specimens and woods to any institution desiring a fine outfit for study. The owner will increase the cabinet to 50,000 specimens in two years and will act as curator. Correspondence solicited from any scientific institution. J. W. Hortter, M.D., Ph.D., San Francisco, Cal., General P. O. Delivery.