not have many large trees, and possibly do not date from many scores of years back. The Island of Culebra, a small island lying to the east of Puerto Rico and belonging to it, is said to be covered by virgin forests. There are several species of tree ferns on the island, always occurring at some distance back from the coast—and on the northern slope, so far as observed. They rarely surpass twenty feet in height.

Meadows have to be made, and for this a crab grass and a festuca or fescue-grass are used. The former is a good strong grass for the meadow and also makes an abundant, excellent, high-green hay. The hay could be imported into New York at a less cost than the inferior hay from up in the State, and could be brought into the market still fresh in the winter and early spring. The fescue is a better grazing grass and grows with great rapidity and to great height when it can support itself on shrubby vegetation. Cattle graze in it up to the brisket, and in protected places along the fences it is often seen from ten to fifteen feet high.

Mark W. Harrington.

THE BOTANICAL SOCIETY OF AMERICA.

The sessions of the 5th annual meeting of the Society were held on Friday and Saturday, August 18th and 19th, in Townshend Hall. The meeting was called to order by the retiring President, Dr. N. L. Britton, who then resigned the chair to the President-elect, Professor L. M. Underwood.

Officers elected for the ensuing year were:

President: Professor B. L. Robinson, Harvard University.

Vice-President: Professor B. D. Halsted, Rutgers College.

Secretary: Professor G. F. Atkinson, Cornell University.

Treasurer: Dr. Arthur Hollick, Columbia University.

Councillors: Professor D. P. Penhallow, McGill University, and B. T. Galloway, U. S. Dept. of Agriculture.

New members elected were:

Professor J. M. Macoun, Canadian Geological Survey.

Dr. W. J. Beal, Agricultural College of Michigan.

Dr. C. F. Millspaugh, Field Columbian Museum.

Dr. M. A. Howe, Columbia University.

On Friday evening the retiring President, Dr. N. L. Britton, delivered a public illustrated address in the chapel of University Hall, on: 'Report of Progress of the Development of the New York Botanical Garden.'

The following papers were read at the several sessions of the Society, in addition to which a number of others were read by title:

'Apetaly and Dioeciousness.' Professor C. E. Bessey, University of Nebraska.

'Symbiosis and Saprophytism' Dr. D. T. MacDougal, New York Botanical Garden.

'The Effect of Centrifugal Force upon the Cell.' Professor D. M. Mottier, University of Indiana.

'The American Species of *Arisæma*.' Dr. N. L. Britton, New York Botanical Garden.

'The Classification of Botanical Publications.' Professor Wm. Trelease, Missouri Botanical Garden.

Arthur Hollick,
Secretary pro tem.

SCIENTIFIC BOOKS.

Naturalism and Agnosticism. The Gifford Lectures delivered before the University of Aberdeen in the years 1896–1898. By James Ward. Two volumes. The Macmillan Co. 1899.

The purpose of Ward's two volumes is not to defend scientific naturalism from the implication of agnosticism, but to show that the only way to escape from the 'determinism' of the naturalist is through philosophical idealism. The book is able and thoughtful and original, and one which all students of science would do well to study. For this reason I shall make no attempt to present a summary of its contents, although I shall try to call the attention of those who have read the book to a point of view which is very different from that of the author.

If one of the lessons of history is that dogmatism is the greatest foe of scientific progress, another lesson is that nothing has done more than reflection upon the meaning of nature to make natural knowledge definite and distinct, to strip it of all side-issues and irrelevant complications, and to put it into the form that commands assent; but the student must remember that the search for purpose in nature has been good for science only so far as it has been earnest and fearless, and, above all, single-minded; for very slight acquaintance with literature is enough to show that, among the motives of many writers upon natural theology, we often find evidence of a desire, conscious or unconscious, to find in nature support for some system of dogmatic theology rather than a basis for natural theology.

That the growth of natural knowledge has been uninterrupted and irresistible is due, in no small measure, to the desire which most of us feel to find out, if possible, what natural knowledge means. There are some, no doubt, who find in this the teleological argument, and see no reason for further search. If effort to find meaning in nature has clarified our concrete knowledge the advantage we have already found in natural knowledge may be its meaning.

Ward, as I understand him, does not share this opinion; for unless the meaning of knowledge is the advantage we are yet to find in it, as distinct from that which we have already found, he assumes that there can be no evidence of intention in nature, for he is one of those who hold, with Satan in the Book of Job, that no one can be expected to serve God for naught.

He tells us—II., 251—that, unless natural law is 'necessary,' the outlook is gloomy; for while the 'conception of Nature as a system of laws is hypothetical' the hypothesis is 'necessary' to our welfare, because 'knowledge of these laws is an indispensable means to that subjugation and control of nature upon which human welfare and advance in large measure depend.' The conception of nature as an ordered whole is therefore 'necessary,' since without it there could be no experience, and therefore no life, since 'experience is life.'—II., 231.

If I understand the naturalist and may be permitted to speak for him, he also holds the necessity of natural law to be necessary for our welfare as rational beings, although he is disposed to ask whether expediency may not be a better word than necessity. Food and drink are necessary to our welfare in this sense of the word, although it by no means follows that we are to have food and drink, for men have died of starvation, and we fail to find in nature any assurance that we may not all so die, for the fact that food and drink are necessary—that is, to be desired—is no evidence that we are to have them.

The naturalist agrees with Ward that our conception of the order of nature is not absolute, but contingent or relative, but he is not prepared to assert that it is a hypothesis; for a hypothesis is a mental product, and he does not know whether the contingency is mental or organic; whether—to use the language of the idealist—it is a sign, or the significance of a sign; whether it is a part of our actual experience or a part of that 'possible experience,' which, we are told, is necessary in order that there may be actual experience.

At any rate the naturalist is quite ready to admit that our conception of nature as rational order is a part of our constitution as rational beings. Using the language of his own little shop, he holds that it is a part of us, "as Nature has made us," although he admits that nature cannot 'make' anything, since nature is neither more nor less than that which is.

Ward tells us that the conception of natural law as necessary to our welfare is teleological, because our rational nature is due to the efficiency of a 'teleological factor,' or Lamarckian principle in the origin of species—Lecture X: that it is teleological because man has made himself, or, at the least, has had an efficient and intelligent part in making himself.

The naturalist, like the idealist, admits human agency, and tries to find out in what sense he is an agent, just as the idealist, while admitting a world of things, tries to find out in what its reality consists. To assert that man has made, or helped to make, himself is not to discover, but to assume, evidence of purpose in human nature. If such language is permissible it is hard to see why is is not also permissible to assert that nature has made men,

or even that "some of nature's journeymen had made men, and made them not well"; for the real question at issue, in each case, is how far the language is figurative.

The context seems to show that Ward does not hold his words to be figurative, for he asserts that not only man, but every living thing, has had an efficient and conscious part in its own production.

"Call an organism a machine, if you will," says he, "but where is the mind that made it, and, I may add, that works it?" And he answers this question by the statement—I., 294—that, while this mind is outside the dead machine, it is inside the living machine or organism and identical with it; for he contends that "mind is always implicated in life," or that, in other words, "a teleological factor, analogous to that of Lamarck, is operative and essential throughout all biological evolution." The context shows that it is not simply as part of an intended system of nature, but as an active agent of efficient cause, that each living thing is said to take part in its own production, although it is not easy to reconcile the statement—I., 294—that the mind of the living thing is inside it with the declaration—II., 127—that it is a 'metaphysical travesty' to assert that a mind can be inside a body. Clearly some of the author's language is figurative, and the reader must find out, as well as he can, what to take literally and what with a grain of salt. However, since "Natural selection works blindly upon promiscuous variation blindly produced," it is, of course, inadequate as a basis for Ward's idealism; although the assertion, in the next sentence, that it is immeterial for natural selection how variations are produced, seems to show that it may be the eye-sight of the process and not that of the product which is defective, if one is able to find any meaning in the statement that a process is blind.

While admitting the existence of the selective process, Ward fails to find in it any efficiency, causality or agency, and the naturalist is more than ready to agree with him, for to him also selection is only a statement of fact and not an efficient cause. He, therefore, fails to see how it can be either blind or possessed of eye-sight. Ward, finding natural selection blind, believes that he finds for it a $\pi o\tilde{v}\ \sigma\tau\tilde{\omega}$ in the Lamarckian principle that "the production of a new organ in an animal body (or in a living body) results from a new want arising and continuing to be felt, and from the new movement which this want initiates and sustains," while the naturalist, if he be also a teleologist, finds the $\pi o\tilde{v}\ \sigma\tau\tilde{\omega}$ in his conviction that it is good to have lived.

Ward, admitting selection but finding it blind, believes that its raw material must be supplied by a 'teleological factor' before it can 'do' anything. He, therefore, asserts that both a non-teleological factor—*natural selection*—and a teleological factor are concerned in the origin of species. He admits that the "complete unravelling of the two sets of factors, teleological and non-teleological, so as clearly to exhibit their respective shares in any given form is probably an impossible task," although we must ask, in this case, how he knows that there are two. "Not a few temples to the Deity founded on some impressive fact supposed to be safely beyond the reach of scientific explanation have," he reminds us, "been overtaken and secularized by the unexpected extension of natural knowledge."

He says that if we understand mind as always implicated in life and operative and essential throughout all biological evolution "we come upon two principles that lead us straight to the teleological factors of organic evolution." One of these is the principle of self conservation; the other is the principle of subjective or hedonic selection. "These principles furnish natural selection with the $\pi o\tilde{v}\ \tilde{o}\tau\tilde{\omega}$ it seems to demand."

"By the principle of subjective selection special environments are singled out from the general environment common to all." "Take the passengers on a coach going through some glen here in Scotland; in one sense the glen is the same for them all, their common environment for the time being. But one, an artist, will single out subjects to sketch; another, an angler, will see likely pools for fish; the third, a geologist, will detect raised beaches, glacial striation, or perched blocks. Turn a miscellaneous lot of birds into the garden; a fly-catcher will at once be intent on the gnats, a bulfinch on the pease, a thrush on the worms and snails. Scatter a mixture of seeds evenly over a diversi-

fied piece of country; heath and cistus will spring up in the dry, flags and rushes in the marshy, ground. * * * Two artists or two anglers may be in each other's way, but an artist and an angler will hardly incommode each other. A garden would still interest a fly-catcher if there were neither pease nor cherries in it, provided the insects remained. Natural selection, as distinct from subjective selection, comes into play only when two anglers contend for the same fish, two artists compete for the same prizes; when the early bird gets the worm that the later one must go without."

So far all seems clear, except that the seeds that fall by the wayside do not seem to have much opportunity to escape from natural selection, or to exercise their teleological factors, although Ward fails to tell us what will happen if the would-be artist has mistaken his vocation, or if the family of the fisherman are suffering because of his absence while he is looking for likely pools. As for the geologist, who seems to have dropped out of sight, he is an illustration of natural selection, for, as Berkeley has pointed out, "the work of science is to unravel our prejudices and mistakes, untwisting the closest connections, distinguishing things that are different, instead of confused and perplexed giving us distinct views; gradually correcting our judgment and reducing it to a philosophical exactness." The correction of our natural responses and their reduction to a philosophical exactness by the suppression of those that are confused and perplexed and the preservation of those that are definite and exact, and, ultimately, by the extinction of the deluded minds and the survival of those that are sane, is what the naturalist means by natural selection.

When we consider how marvellous are the activities of a living organism, and how far the wisest man is from perfect knowledge of even the simplest organic mechanism, it is clear that we cannot hope for much from its attempts to give intelligent help in its own production; and Ward tells us that the condition of progress "seems provided, without any need for a clear prevision of ends or any feeling after improvement or perfection as such, simply by the waning of familiar pleasures and by the zest of novelty. In the midst of plenty it is usual to become dainty and to make efforts to secure better fare, even though the old can be had without them."

"Thus—even if there were no natural selection of variations fortuitously occurring, and even if there were no struggle for subsistence, still—the will to live, the spontaneous restriction of each individual to so much of the common environment as evokes reaction by its hedonic effects (with the increasing adaptation and adjustment that will thus ensue) and, finally, the pursuit of betterment to which satiety urges and novelty prompts—these conditions, really implying no more than the most rudimentary facts of mind, will account for definite variations to an apparently unlimited extent. What is more, the variations so produced, even if there were no others, would furnish natural selection with an ample basis as soon as struggle for existence began."

Thus we find that, even if there were no natural selection, the principle of self-conservation, and the principle of the zest of novelty—selfishness and want of steadfastness—are enough to bring about exquisite adjustment of each living thing to its environment. To this, exhaustive analysis of Ward's two volumes brings us down, and from this, he assures us, a rational synthesis builds up the philosophy of idealism; for nothing is easier than for one who is not a naturalist to improve upon the work of Charles Darwin.

The naturalist may be disposed to ask, however, whether unselfish interest in the welfare of the race and of posterity may not be at least as important in the history of organic evolution as 'the teleological principle of self-conservation.' Inasmuch as innumerable species have been exterminated for each one which now survives, and inasmuch as it can be proved that the genetic lines of most of the living organisms that now exist are destined to rapid extinction, it is clear that, as a matter of fact, most living things that have had a part in the selection of their environment have made more or less of a mess of it; for no one except a philosopher can lose sight of the truth that aptitude for experience is not, unfortunately, the same as aptitude for beneficial experience. It is at most no harder to acquire pernicious experience than to acquire

beneficial experience; no harder to cultivate bodily infirmity, or logical inconsequence, or mental imbecility, or moral obliquity, than to make the best of our faculties and opportunities.

The naturalist must also ask whether the contented enjoyment of normal life may not afford better evidence of intention than fickle lack of stability.

Those who are satisfied with the sort of natural theology which finds its type in filial affection, based upon gratitude rather than expectations, may possibly find evidence for this sort of teleology in nature, without first settling the disputes of the philosophers about the relation between mind and matter.

The most obvious answer to reasoning like Ward's is that we fail to find in nature any reason why all life, or, for that matter, all nature, may not come to an end this instant; for the assertion that the stability of nature is necessary to our welfare means nothing more than that this stability is much desired by those who have found life worth living.

If we are sure only of the present and of the past, and if science gives us nothing more than reasonable expectations about the future, which may or may not prove well founded, it is evident that we must look to the present and to the past for evidence of purpose in nature if we are to find it in nature at all.

They who are dissatisfied with this sort of purpose, and tell us it weighs upon them like a nightmare, must remember that there is no reason to doubt and good reason—as good reason as our own existence—to expect that the future will, on the whole, be essentially like the past; and that while the so-called predictions of science are no more than reasonable expectations they are reasonable expectations, since they are part of our nature as reasonable beings, as we have come about in accordance with the mechanical principle of natural selection.

If I am sure that natural knowledge has been useful and profitable and delightful to me I am as utterly unable to see why the discovery of a mechanical equivalent for truth should affect this conviction as I am to see how the scientific study of the mechanism of digestion can destroy my conviction that food and drink have, on the whole, been good for me: as unable as I am to see here proof that I do nothing which one who had exhaustive knowledge of any organic mechanism might have expected one to do, would prove that I am not reasonable and responsible. It is true that I have suffered because of my food, but I have never suffered from natural knowledge, and better knowledge of the mechanism of digestion might have helped me to avoid this suffering.

So far as I understand the scientific frame of mind, and may be permitted to speak for the naturalist, he is neither a materialist nor an idealist nor an agnostic monist, although the 'possible experience' of the idealist seems to him to afford ample room for a physical universe as material as the most ardent materialist could desire. It also seems to him that if common folks are to refrain from a search for purpose in nature until the philosophers have settled all their little questions and have reached an agreement among themselves they had better abandon all hope of finding the meaning of nature.

Each new philosopher assures us that his only motive is to help us to reach the truth and to set our minds at rest, but it may be that while philosophers fall out the simple-minded men of science may come by their own and live at ease.

W. K. Brooks.

Johns Hopkins University.

The Races of Europe. William Z. Ripley. New York, D. Appleton & Co. 1899. Pp. xxxii+624. Accompanied by a Supplementary Bibliography of the Anthropology and Ethnology of Europe, published by the Public Library of the City of Boston. Pp. x+160.

The interesting series of articles on the physical anthropology of Europe which Professor Ripley contributes to *Appletons' Popular Science Monthly* has been published in a revised form under the above title, accompanied by a very full bibliography of the subject. The work is based on a study of the very extensive published and much unpublished material that has been collected in various parts of Europe, and is an attempt at coordinating the results obtained by European investigators. The labor and the difficulties involved in a task of this kind are formidable, and the author deserves the thanks of all students for having made