formal than the short addresses mentioned above. All of these evening meetings could easily finish by 9:30, and give an opportunity thereafter for banquets and social gatherings, which have been a characteristic feature of previous meetings.

We believe that a classified system, such as described above, and including not only the regular papers presented before the American Association but also those before special societies, would do much for the advancement of science in America. The attending scientists would have, in the morning, a series of general scientific papers of interest to most of them, while meetings of subsections or special societies occurring in the afternoon would give an opportunity for the consideration of technical questions. The semi-popular short addresses in the evening would appeal to many of our members, while the more formal public lectures by prominent men would be an important stimulus and result in materially advancing science in America.

E. P. FELT.

THE WRITINGS OF WILLIAM J. LONG.*

THE last quarter of a century has seen a remarkable development of that form of literature which consists of charming popular writings about animals and their doings. A leader in this movement was John Burroughs, whose work combines literary grace with scientific truth to a degree not surpassed by that of any other modern nature writer, and there are several others in this country writing in the same spirit. Recently, however, there have arisen somewhat suddenly into prominence three writers on nature subjects whose works enjoy a popularity far surpassing that gained by any of their predecessors or contemporaries. These three are Mr. Thompson Seton (earlier known as Seton Thompson), Mr. W. J. Long and Mr. C. G. D. Roberts. Of the former I know little, but the two latter have written extensively of New Brunswick animals, and hence I have been much interested in their works, upon which I propose to make some comments from the point of view of New Brunswick natural history.

In examining the works of these two graceful writers, two queries naturally arise: First, as to the cause of their surpassing popularity, and second, as to their real scientific worth. The cause of their popularity is easily found. It does not lie in their literary charm primarily, for in this they do not so far surpass other nature books, but it consists in this, that they tell about animals, not as they are, but as people like to think they are. It is the humanization and idealization of animals, which, under the influence of the remarkable literary skill of these authors, has made their animal stories so popular. To accomplish this end, they have had to cut loose from the trammels of fact which hampered their predecessors, and have given their imaginations full play, thus producing fascinating works of fiction disguised as natural history. It is, however, this disguise which constitutes the chief ground of criticism against these works. We all agree that the use of animals as the heroes of romances is perfectly legitimate, but if such works pretend also to be accurate natural history, they unfairly deceive their readers and dishonestly claim a position to which they have no real title. It happens unfortunately that the works of both Mr. Long and Mr. Roberts are widely accepted as accurate in their natural history by the great majority of readers. Mr. Long positively claims that all he writes is accurate fact based on his personal observation, while Mr. Roberts allows an extensive personal knowledge of animals to be inferred, and takes no steps to correct this popular error.

Mr. Long has published five books on animals, containing many references to New Brunswick. The most characteristic feature of these books, especially of the later, is the marvelous character and remarkable number of the experiences the author claims to have had in his observations of animals. The aggregate of Mr. Long's reported observations, both as to quantity and character, is such that if all he reports is true, he has seen more widely and deeply into animal life than all other students of animal habits taken to-

* Read before the Natural History Society of New Brunswick (Canada), March 1, 1904.

gether. This I am not prepared to believe, especially in the light of the tone of his own writings, which seem to me to show that he possesses neither the temperament nor the training essential to a disinterested observer. I have no proof, with the single exception noted below, that any individual statement of Mr. Long's is untrue; but an experience in the New Brunswick wilderness at least as great as Mr. Long's has given me such a knowledge of the difficulties of observing wild animals in their native haunts that I can not believe that any man has had all of the remarkable experiences reported by Mr. Long. Furthermore, the one case in which I happen to know personally the evidence on which Mr. Long bases a statement does not allow me to entertain a high regard for his accuracy. In his book 'School of the Woods' he claims to have seen fish hawks catch and wound fish which they then dropped back into the water in order to teach their young to dive for them. This statement is criticized by Mr. Burroughs in his article on 'Real and Sham Natural History' in the *Atlantic Monthly* for March, 1903, and in his reply to this article in the *North American Review* for May, Mr. Long reaffirms it, and adds: 'Mr. Mauran Furbish, who probably knows more of the New Brunswick wilderness than any other man, has told me since my book was written that he had seen the same thing.' Thinking I knew the incident on which this statement was based, I wrote Mr. Furbish, who has been my companion in two journeys into the wilderness of New Brunswick, asking what statement he had made to Mr. Long. He replied that he had simply told Mr. Long of our finding one day a wounded gaspereau floating at the foot of a lake and that Mr. Long 'had furnished all the romance and the reason for their being there.' This incident, I believe, gives the clue to the character of much of Mr. Long's work. He does not deliberately invent, but some trifling basis of fact happening to fit in with some theory developed by his sympathies is accepted by him as confirming his surmises, which he thereupon considers and publishes as proven. Mr. Long's books undoubtedly contain a great deal of valuable fact, but this is so mixed with matter that can not possibly be accepted simply on Mr. Long's statement, that it makes his works practically valueless for any scientific purpose.

Mr. Roberts, I believe, nowhere makes any claim that the natural history basis for his animal writings rests on personal knowledge, but that is the impression left with the reader, and Mr. Roberts takes no steps to set him right. Those who know Mr. Roberts are aware that his literary work for several years past has not permitted him to make those journeys into wild New Brunswick essential to the study of its animal life, and that his few earlier trips had not this object in view and were not of a character to permit it. His knowledge of New Brunswick animals has been gained chiefly in the public libraries, museums and menageries of New York City; his material is hence mostly second hand, and it is unfair to his readers that they should be given the impression that these works are founded on a personal knowledge of the animals described. If Mr. Roberts would but state in the preface to his books that his studies are not based upon personal observation of their subjects, but are as accurate as he can make them from other sources of information, he would not only be dealing honestly with his readers but he would, in my opinion, greatly enhance the value of his really remarkable imaginative works.

So opposite are the standpoints from which the scientific and the literary man view animal life, and so entirely indifferent are they to one another's standards, that the two are not only nearly impossible to one person, but they are well nigh mutually exclusive. The charm of the study to the man of science is the triumph of demonstrating the truth. He makes this his sole standard as it is his sole reward. Slowly, patiently, laboriously, indifferent to popular opinion as to popular applause, he makes his resistless advances, testing and proving each step before a second is made. He naturally has little regard, therefore, for showy leaps from scanty fact to sensational generalization, and he has no respect at all for a pretence of scientific knowledge not based upon an honest foundation. The lit-

erary man, especially the new nature writer, seems to view nature chiefly in the light of a fresh supply of literary material, and he values her phenomena in proportion to their adaptability for interesting and clever treatment. To him the truth is not of first importance, and imagination is allowed to improve upon nature whenever she can thereby be made more available for literary uses. All this may be legitimate in literature, but works thus inspired should not expect to be accepted also as science, nor should they pretend to an authority they do not possess.

SMITH COLLEGE. W. F. GANONG.

IF the article entitled 'Woodcock Surgery' (SCIENCE, February 26) were nothing worse than a frisky, good-natured breeze every one would doubtless be willing to let it pass without notice, but its temper and twists are such as to require a word that may possibly 'seem unkind.' Its author says that Mr. Long "virtually claims that a woodcock not only has an understanding of the theory of casts as adapted to fractured limbs, but is able to apply this knowledge in practise. The bird is represented as knowing the qualities of clay and mud, their lack of cohesion unless mixed with fibrous substances, their tendency to harden on exposure to the air, and to disintegrate in water." "His woodcock is familiar with the theories of bone formation and regeneration—in a word, with osteogenesis." "He divines the functions of the periosteum," etc. Instead of claiming anything of the kind, Mr. Long tells us in simple language what he has seen, offering neither inferences nor generalizations. It is his critic, Mr. Wheeler, who 'virtually' affirms that a woodcock could not apply mud to a broken leg without a knowledge of surgery; and it is much as if he should say that a man who blows on his fingers to warm them or on his tea to cool it has a knowledge of the laws of thermodynamics and is ready to discuss entropy or an indicator diagram. It is the merest commonplace fact that in order to avoid danger, to lessen pain, to save life, to gain pleasure, human beings are constantly performing acts the underlying principles of which they understand scarcely any better than a woodcock understands the principles of surgery. This difference between what may be expected of man and of a bird is probably one of the recondite features of Mr. Wheeler's animal psychology. If this 'serious student' means that action apparently or really intelligent on the part of animals implies scientific training and knowledge and accounts of such action are, therefore, to be contemptuously dismissed as 'untrue,' he has taken ground which he will undoubtedly be left to occupy alone. One wonders that he has not long since exposed Mr. Darwin. The books of the master naturalist are full of anecdotes that, according to Mr. Wheeler, must be discredited. For instance, there is the delightful one of the motherly baboon who stole young dogs and cats which she continually carried about. "An adopted kitten scratched this affectionate baboon, who certainly had a fine intellect, for she was much astonished at being scratched, and immediately examined the kitten's feet, and without more ado bit off the claws" ('The Descent of Man,' Chap. III.). Why does not Mr. Wheeler rise up and say that Darwin 'virtually claims' that the baboon was familiar with the 'Novum Organum' and the 'Positive Philosophy,' and further say that this anecdote is a specimen of the 'drivel in which animals are humanized beyond all recognition.'

The woodcock incident is further discredited because the naturalist was a lad of sixteen when it occurred. The editors of *Bird-Lore* seem to think that lads of fourteen or under are capable of making pretty good observations (see *Bird-Lore*, January-February, 1904). But this incident dates back twenty years, we are reminded. That the lapse of twenty years will certainly or even probably cause a 'distortion and exaggeration of the impressions' made on the mind of a boy of sixteen, even when the impression is exceptionally vivid, implies a theory of memory which is, perhaps, another peculiarity of the critic's psychology.

Finally, ridicule is heaped on Mr. Long because he presumes to bring forward a witness of what he believes to have been another case of animal surgery, and to give the credentials

of that witness. To those who have paid some attention to the nature of evidence it will be a matter of interest to learn, first, that additional witnesses and additional instances do not strengthen a case; and second, that the trustworthiness of witnesses is of no consequence. What a lot of bother men of science would have been spared if they had only known this before; for it is unnecessary to point out that the history of science abounds in accounts of efforts to gather evidence and to determine the weights of various pieces of evidence.

So far as the article 'Woodcock Surgery' affords a cross-section of its author's style of reasoning some of his universals seem to be: (1) Action that results in a causal correlation of antecedent and consequent is intelligent action in the sense that the agent understands the principles involved in the correlation; (2) any phenomenon which *B* has not witnessed *A* can not have witnessed; (3) unless an event is of common occurrence it can not occur at all.

Whom the gods wish to destroy they first lure into premises of this sort.

As regards the 'nature-study' classes in our schools, Mr. Wheeler may be spared that part of his anxiety which relates to the effect of such books as 'A Little Brother to the Bear' and 'Wilderness Ways.' One may well wish that every boy and girl in the land might become acquainted with Killooleet and Cloud Wings and Hukweem. Children and mere lovers of nature on the one hand, and comparative psychologists on the other, owe no small debt to men like William J. Long who have the patience and pluck to spend years in the wilderness home of birds and beasts in faithful observation of their life and habits.

Ellen Hayes.

THE PRESENT STATUS OF SOIL INVESTIGATION.

An address delivered on this subject before the Association of American Agricultural Colleges and Experiment Stations, November 17, 1903, and immediately published as Circular No. 72 of the University of Illinois Agricultural Experiment Station is discussed by Dr. F. K. Cameron in Science, February 26, 1904, page 343. Dr. Cameron states that the criticisms of his Bulletin 22 (Bureau of Soils) which have appeared are to the effect that the authors of the bulletin (Whitney and Cameron) 'have concluded that the use of fertilizers is of no value in affecting the yield of crops.' He further states that 'these criticisms have generally been copied from Circular No. 72, Agricultural Experiment Station, University of Illinois.'

As a matter of fact this statement does not occur in Circular 72, consequently, the objection to 'inexcusable carelessness of misquoting results and statements in a controversial paper' is strictly applicable to Dr. Cameron's own first paragraph. It is not believed that Cameron or any other theoretical chemist is so ignorant of agricultural science and practise as not to know that the use of fertilizers is of value in effecting the yield of crops. The statement in Circular 72 is that Bulletin 22 is commonly understood to teach that the use of fertilizers 'has little or no tendency toward permanent soil improvement, and that even the effect which they do produce is due very largely, if not entirely, to improved physical condition of the soil.' It is certainly safe to say that scientists and agricultural editors and practical farmers are all agreed that this is the teaching of Bulletin 22 regarding the use of fertilizers.

It will thus be seen that Doctor Cameron devotes much valuable space to a matter which is not pertinent to the discussion.

Both Bulletin 22 of the Bureau of Soils, Washington, D. C., and Circular 72 of the Illinois Experiment Station, Urbana, Ill., are available to the reading public, and consequently it is quite unnecessary and unreasonable to expect Science to reproduce any large part of those publications. The following direct quotation from page 59 of Bulletin 22 fairly illustrates its teaching:

> In the truck soils of the Atlantic coast where 10 or 15 tons of stable manure are annually applied to the acre, in the tobacco lands of Florida, and of the Connecticut Valley, where 2,000 or 3,000 pounds of high-grade fertilizers carrying 10 per cent. of potash are used, even where these applications have been continued year after year for a considerable period of time, the dissolved salt content of the soil as shown by this method