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SUGGESTIONS FOR IMPROVING THE LITERARY STYLE OF SCIENTIFIC MEMOIRS.

BY FRANCIS GALTON, D.C.L., HON. SC.D.CAMBRIDGE, F.R.S.

[Read April 29th, 1908.]

THE memoirs published by scientific societies are blamed with justice for being more difficult of comprehension than need be, owing to a want of simplicity in their language, of clearness of expression, and of logical arrangement. Forcible remarks in this sense were publicly made, by more than one person, at and about the time of the last Anniversary Meeting of the Royal Society. This opinion had also been held by myself for many past years, during which I have chafed at the impediment caused by rugged and careless writing to my honest endeavour to keep abreast with the advances of modern science. Success in this, under the most favourable conditions, and in only one branch of science, would occupy the spare energies of most men. It is a cruel addition to their labours that the information they need should be contained in crabbedly written memoirs.

It has been my lot to serve on the councils of many scientific societies, and to have had more MSS "referred" to me than I could now enumerate. My experience is that an undue proportion of them had to be read more than once, and to be

puzzled over in parts, before it was possible to justly comprehend what their authors had in their minds to say.

It must not be imagined for a moment that I pose as a literary critic. I am far too sensible of my own grave deficiencies to assume that position. But a man need not be a cobbler in order to know when his shoe pinches. My standpoint is merely that I find many scientific memoirs difficult to understand, owing to the bad style in which they are written, and that I am conscious of a rare relief when one of an opposite quality comes to my hand.

Having become a Fellow of the Royal Society of Literature through the invitation of the Council, I seize the opportunity of asking its powerful help in considering methods by which this grave defect may be lessened. To this end, I will proffer some suggestions of my own, which I hope will be well discussed, and may induce others to assist in this crusade. If useful conclusions should be reached, it would be open to Fellows of scientific societies to press for reforms, under the consciousness that the proposed methods for obtaining them had been carefully considered, and were not simply the crude offspring of their individual brains. I ask for nothing that lies outside of the purview of the Royal Society of Literature. It is not proposed by me that the Society in its corporate capacity should thrust advice upon the scientific societies, who might resent interference, but merely that it should discuss certain general principles, leaving action upon them to other hands, in the way just described.

I now proceed to speak of some of the literary

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defects, other than bad grammar and faulty syntax, that make scientific memoirs difficult to understand. One of the most prominent is a superfluous use of technical expressions that have not yet become naturalised among scientific men. It is impossible to avoid the use of technical words, but their number should be minimised. It is especially needful to do so in the opening paragraphs of a memoir, whose function is to explain the object of the writer in the plainest possible language. If it be necessary to use unfamiliar technical words, their meaning ought to be defined in a foot-note. The opening paragraphs of a memoir should be intelligible to any man who is conversant not only with the branch of science to which it belongs, but to allied branches also. A similar remark applies to the concluding paragraphs, in which the author summarises his results. The intending reader will then be able to judge for himself whether or no the memoir falls within his own province and merits his further study. Owing to a want of care in writing the opening paragraphs, it has not infrequently occurred to myself, and doubtless to others, to have been perplexed about the exact purpose of a paper until it has been half read through.

Some *veto* is desirable before a Society gives its "imprimatur" to newly coined words, for many of them fail to express their meaning, and very many are unnecessarily cumbrous. The way in which the *veto* might be applied will be explained later on, I now am merely calling attention to its need. To take one example of bad nomenclature, the contrasted terminations of the two Mendelian words "domi-

nant" and "recessive" imply a distinction which does not exist. Re*cedent* would have been unobjectionable on that ground.

The nomenclature of modern chemistry seems preposterous to outsiders, even after making liberal allowance for inherent difficulties. I copy one of these chemical words from a paper now lying on my table, it is "Dimethylbutanetricarboxylate," and is not the longest that might have been adduced. But it suffices for an example. It is of course understood that these are what have been termed "portmanteau" words, in which a great deal of meaning is packed, but they are overlarge even for portmanteaux; they might more justly be likened to Saratoga trunks, or to furniture vans. It is with the greatest diffidence that I suggest that a single letter might sometimes suffice to show what is now delegated to one or two syllables; if so, the word would be shortened in proportion. In certain barbarian languages this is a familiar process.

Long English words and circuitous expressions are a nuisance to readers, and convey the idea that the writer had not that firm grasp of his subject which every one ought to have before he takes up his pen. Clear views are naturally expressed in brief and incisive language. The power of the English tongue when limited to the use of words of one or two syllables is remarkably great. Excellent instances of this are to be found in the writings of Tennyson. I will quote some marvellously graphic descriptions from his *Palace of Art*, which refer to certain well-known pictures, and are written under the above limitations.

"One showed an iron coast and angry w
You seemed to hear them rise and fa
And roar rock-thwarted in their bellow
Beneath the windy wall.
And one, a full-fed river winding slow
By herds upon an endless plain,
The ragged rims of thunder brooding
And shadow streaks of rain."

There are about twenty gems like *Palace of Art.*

The to-and-fro arguments in the *T* equally concentrated and forcible.

"The memory of the withered le
In endless time is scarce more l
Than of the garnered autumn sl
Go vexed spirit, sleep in trust;
The right ear that is filled with
Hears little of the false or just."

Or again—

"Yea, said the voice, thy dream wa
While thou abodest in the bud,
It was the stirring of the blood.
If Nature put not forth her power
About the opening of the flower,
Who is it that could live an hour
Then comes the check, the change
Pain rises up, old pleasures pall,
There is one remedy for all."

The comparative rarity among the keen sense of the difference between literary style is a great obstacle to desire. It is especially noticeable younger scientific men, whose educat

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"Yea, said the voice, thy dream was good,
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The comparative rarity among the English of a keen sense of the difference between good and bad literary style is a great obstacle to the reform I desire. It is especially noticeable among the younger scientific men, whose education has been

over-specialised and little concerned with the "Humanities." The literary sense is far more developed in France, where a slovenly paper ranks with a disorderly dress, as a sign of low breeding.

I have had occasion to read many memoirs in manuscript, on subjects where I was fairly at home, in which there was nothing especially recondite, but the expressions used in them were so obscure, the grammar so bad, and the arrangement so faulty, that they were scarcely intelligible on a first reading; nevertheless the writers could hardly be made to perceive their shortcomings. I have heard equally bad reports relating to essays sent by candidates for Fellowships at Colleges in one at least of our Universities. The writers of them may have been, and probably were, successful investigators, but their powers of literary exposition were of a sadly low order; so low that they could hardly be made to realise their deficiencies. The preliminary culture of students in science, seems usually to have been very imperfect.

Sufficient has now been said as to the need of reform and of the difficulties to be overcome in affecting it. It becomes our next duty to consider the steps that should be taken towards that end. The power of reform lies largely in the hands of the councils of the scientific societies, who can withhold the publication of memoirs presented to them, or accept the memoirs under such limitations as they please. A Society gives much, consequently the Council who represents it has a right to exact much in return. The Society supplies a stage from which a writer can disseminate his views, and have

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them subjected to the criticism of experts. It defrays the cost of publication of the memoirs, and, under occasional circumstances, that of preparing expensive plates. Therefore the Society, or its Council on its behalf, may fairly demand that the memoirs should be written in a style that is creditable to their journals; that they should be lucid, logical, and as easy for its members (who pay for the publication) to understand as the nature of the subject permits. I suggest that Councils should require a report on the literary sufficiency of every proffered memoir, before discussing whether it should be accepted for publication. It is hardly necessary to bring to remembrance that it is the universal practice of Councils of Scientific Societies to "refer" every memoir that is submitted to them. One, two, or more referees are selected among those of their Fellows who are able to give a trustworthy opinion on the merits of the paper. The referees are each supplied with a schedule on which numerous searching questions are printed, which they are requested to answer confidentially. Their reports are read to the Council, which then proceeds to discuss the question whether or no the memoir should be published as it stands, or subject to some restriction, or be rejected altogether. What I now suggest is that the printed reference paper should include questions as to the literary suitability of the memoir. They might be such as—"Do you consider the memoir to be (1) clearly expressed, (2) free from superfluous technical words, (3) orderly in arrangement, (4) of appropriate length. (5) State whether any new terms are used in the memoir, mention

what they are and whether you consider them appropriate. (6) Add such general remarks on its literary style as you think would be useful to the Council when considering its publication."

I do not presume to anticipate what action a Council might take if the answers to these questions were more or less unfavourable, as much would depend on other considerations. What I want is that the members of the Council should not be left in the dark, as they usually now are, on one important element of goodness or badness in the memoir, before they consider the question of its publication. Also that they should appreciate the widely felt desire for literary reform.

There is yet another way in which scientific societies might be made to realise the occurrence of literary faults in the memoirs that they publish, namely, by occasional articles containing a selection of passages that are conspicuous for shortcomings.

I now crave your opinions on these suggestions, and hope that you will be able to offer other recommendations that may help in accomplishing the very important object in view; namely, that of improving the literary style of future Memoirs published by Scientific Societies.

DISCUSSION.

Sir Edward Brabrook.—I have pleasu
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DISCUSSION.

Sir EDWARD BRABROOK.—I have pleasure in supporting the proposal of Mr. Francis Galton. I have had some experience, far less of course than his, as a referee of scientific MSS, and it fully accords with his. I associate myself, therefore, with his observations as to the *rôle* the Royal Society of Literature should take up in this matter. It is within the rightful functions of the Society to take note of words that are not yet dictionary words, and see to their proper applications, but to do so would be a difficult matter. As Mr. Galton says, the chemists are greatly addicted to coining long words. The report of the Leicester meeting of the British Association just issued gives us a portmanteau word of thirty-five letters—"chloroketodimethyltetrahydrobenzene"—and I have seen some worse than that. That, however, is not the main point. The use of difficult technical language cannot be avoided. What is wanted is to urge the authors of papers to write good English; many of them sadly fail in this respect. Mr. Galton's suggestion as to the addition of a question to the referee paper is excellent. I think it would be quite the right thing for the Council to send a copy of his paper to the various scientific societies, and recommend that suggestion to them for adoption. I agree with the view expressed by a committee of the British Association, which might indeed itself have been put into better English, "that the opportunity furnished by the necessity for writing an account of what a student has done and seen in his laboratory work ought to be utilised in relation to the teaching of English composition."

Sir ARCHIBALD GEIKIE.—The complaints so forcibly and temperately urged by Mr. Galton in the paper to which we have listened will awaken much sympathy, not only in the general public, but among a large number of men of science. I do not appear here with a brief in defence of the scientific societies, though I think that some strong pleas might be pressed in their favour. Looking at the question, however, as a matter affecting the English language and literature, I am bound to confess that the strictures contained in the paper are by no means without foundation.

It seems to me that no candid reader can compare the scientific memoirs published at the present day with those which appeared a hundred years ago, without coming to the conclusion that, in average literary quality, the modern writings stand decidedly on a lower level than their predecessors, and that the deterioration in this respect is on the increase. The earlier papers were for the most part conceived in a broader spirit, arranged more logically, and expressed in a better style than those of to-day. They show their authors to have been generally men of culture, who would have shrunk with horror from the slipshod language which is now so prevalent.

If it be asked what reason can be assigned for this change, various causes may be suggested. In former days, when life was less strenuous than it has now become, the number of men of science was comparatively small, and they belonged in no small measure to the leisured classes of the community. They were not constantly haunted by the fear of losing their claims to priority of discovery, if they did not at once publish what they had discovered. They were content to wait, sometimes for years, before committing their papers to the press. And no doubt the printing of their papers was likewise a leisurely process, during which ample opportunity was afforded for correction and improvement.

But this quiet, old-fashioned procedure has been hustled out of existence by the more impatient habits and requirements of the present day. The struggle for priority is almost as keen as the struggle for existence. As soon as a new observation is believed to have been made, the happy author of it too often dashes off a paper, in more or less legible manuscript, and forwards it without delay to some scientific society or journal for publication. In such hurried contributions attention to literary considerations finds little or no place.

Besides this too common haste in production, another and more serious cause for the defects of which Mr. Galton complains is to be found in the continually augmenting specialisation of science. Advance in every department of inquiry leads into more and more detailed studies. It becomes increasingly difficult, even for men whose lives are devoted to the pursuit of science, to keep in touch with the progress of more than one province of investigation, or even one section of a province. Details thus come to acquire, in the eyes of many earnest and enthusiastic

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workers, an interest and importance at least as great as can belong to the broad deductions or principles up to which they lead. These authors in their paternal fondness for the details which they have patiently and toilsomely elaborated, often crowd them into their papers, which consequently look sometimes more like leaves torn out of field note-books or laboratory journals than reasoned presentations of the results of research. It would probably be found that, as a rule, such excessive exposition of the details of the several steps in an inquiry is as unnecessary from the scientific point of view, as it is repellent from the literary side.

Closely connected with this specialisation and augmentation of detail is the increase in the number of new technical terms with which the papers in every department of science now bristle. The multiplication of such terms is admittedly a necessary accompaniment of the development of scientific research. It is obvious that each new fact brought to light in the investigation of nature should be precisely defined by some word or phrase having a definite, unambiguous signification, and preferably capable of being adopted with but slight modification into any modern language. The plea that the vernacular tongue should, where possible, be employed for this purpose is met with the objection that the language of science ought, as far as possible, to be cosmopolitan, and that those terms are most suitable which can be most easily adapted into the vocabularies of other countries. Hence the preference for coining new compounds from Greek and Latin. Lovers of the purity of the English language and the dignity of English literature may not unnaturally be grieved to see such a flood of novel and often, it must be confessed, uncouth words coming into use at a rate with which the most industrious lexicographers cannot keep pace. But the flood is inevitable, and must increase in volume, nor is its gathering strength to be stemmed by any protest. All that, perhaps, may be reasonably insisted upon is that each new term shall be absolutely necessary, shall not be unduly cacophonous, and shall not be compounded from more than one language nor framed in defiance of the grammar of the tongue, whether living or dead, from which it is borrowed.

Many men of science share Mr. Galton's regret that it is becoming more and more difficult or even impossible to follow with full intelligence and sympathy the advances

made in departments of investigation with which one is not personally in touch. The difficulty is probably inseparable from the rapidity of the increase of knowledge in all domains of nature. But there can be little doubt that it is in no small degree aggravated by the multiplication of technical terms which do not always explain themselves, and for which no explanation is afforded in the papers where they are so rampant. It is becoming every year a more accepted practice that in writing a scientific paper an author has only to consider the fraternity of his own branch of science. If his colleagues understand him, it does not matter whether or not he is comprehended outside their circle. He forgets the interests not only of the general public but also of his fellow-labourers in other fields of research, many of whom would gladly keep themselves informed of the progress of inquiry in departments lying beyond their own special purview, but who are, in too many instances, deterred by the formidable terminological barriers that must first be surmounted. The growing isolation of scientific workers within their own fields of investigation is an evil which may, perhaps, be inevitable, but which, undoubtedly, is much to be deplored. Anything which can be done to lessen it is worthy of the most serious consideration. Since the language of the biologists is becoming increasingly unintelligible to the physicists, and that of the physicists not less so to the biologists, Mr. Galton's suggestion might be usefully adopted, that where necessary or desirable a scientific paper should include a brief summary of its general purport expressed in simple untechnical language. Such a concession to the ignorance of the general reader would probably be welcomed by a large body of scientific men.

It must not be supposed that scientific societies are wholly blind to the evils which have been pointed out in the interesting paper that has been read this afternoon. They are by no means negligent as to the form and style of the papers submitted to them. On the contrary, they have an elaborate system of committees and referees acting under the jurisdiction of the Councils, and no paper is sanctioned for publication without having been subjected to this process of examination. Moreover, the secretaries or assistant secretaries are usually vested with editorial powers, which are exercised as an additional control over the production of the papers. If the original condition of

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some contributions were compared with their ultimate published form, it would be seen how much care has been bestowed upon their improvement. In more than one learned society attention has recently been called from the Presidential chair to the defective form in which papers are too frequently presented. We must hope that from these and other efforts towards amelioration some good will follow. While in the publications of a scientific society literary excellence will always be subordinated to scientific merit, there is surely no reason why the two qualities should not be more generally combined than they at present are. Such a combination will, perhaps, be most likely to be effected when the writers of scientific papers come to realise that it will be in their own interest, as well as in that of their scientific brethren at large, and still more of the outside public, to present such a summary of their work as may be intelligible, and even interesting, to any ordinary cultivated reader.

Mr. Crackanthorpe, K.C. (who was invited to speak by the chairman), said the most interesting remark he had to make was in regard to the health of the author of the paper just read by Mr. Pember. He had seen Mr. Galton that day, and had found him quite cheerful, but confined to his room. There was reason to believe that he would very soon be completely his old self, and able to resume the beneficent work to which he had devoted most of the years of his life. (Applause.)

The first point made in Mr. Galton's paper was that a scientific memoir should be "simple in its language, clear in its expression, and logical in its arrangement." These were virtues which every prose composition should possess, whether written or spoken. They should be aimed at alike by the man of science and the layman; by the learned and the unlearned; by the leader-writer in the daily press; and the orator on the platform. Schopenhauer had pointed out that the first requisite for the art of writing was to have something to say; and the second, to have clearly thought out the subject in hand. Then, what was called "literary style" would come of itself. There was an old French saying—"the style was the man." At all events, it was, or ought to be, an expression of the natural mood of the man at the moment of his writing.

Mr. Galton's next point was that a scientific memoir should not use unfamiliar technical words without explain-

ing them in a foot-note, nor more of such words than was absolutely necessary. He (Mr. Crackanthorpe) agreed, although he thought the first of these cautions was rather vague. It might be asked, Unfamiliar to whom? There were, for instance, many technical words which were unfamiliar to him (the speaker), but no doubt quite familiar to Mr. Galton. Where was the line to be drawn? One would hardly expect to find in a scientific work a glossary of terms such as an Englishman looked for in a collection of Burns' Poems. Every scientific writer was surely entitled to assume that his reader had some technical knowledge—otherwise his explanations would be endless. At the same time, if an explanation were given, care should be taken to make it adequate. He would illustrate what he meant by an example. Anyone taking up one of the numerous books on Heredity, now appearing in the British and German markets, would come across the word "chromosome." He met the other day with this word in a very valuable treatise just published, "with stainable body" added by way of explanation. Was this adequate? The white tablecloth, now in that room, was a "stainable body" (in the mechanical sense); and so were a hundred other everyday things. If any explanation was wanted, should not the reader have been told, either in a foot-note or an appendix, how colouring matter served to detect the presence of minute particles of matter otherwise invisible even to the microscope-aided eye? Then, the explanation would have been alive.

He might mention by the way, that this same word "chromosome" violated one of the canons laid down in the paper. It was, like the "recessive" of the Mendelians, an instance of "bad nomenclature," because it was wrongly formed. The word should, in strictness, not have been "chromosome," but "chromatosome," since the Greek for "colour" was not *chromos* but *chroma*.

As to the second of Mr. Galton's cautions, viz. against the use of more technical words than necessary, he would illustrate the point by reference to the "idants" and "ids" of Weismann. It appeared that the nucleated masses into which a dividing cell broke up consisted of several parts. To these Weismann gave the names of "idants"; and since "idants" were theoretically decomposable into particles more minute, he gave to these last the name of "ids." One wondered why he stopped there. He should have gone on to subdivide his "ids" into "i's," and these again into mere dots, g technical name, thus recalling the old line

> "Big fleas have little fleas upon their backs
> And these again have lesser fleas, and so a

(Laughter.)

In this connection he desired entir himself with what he understood to fall fr Geikie, and to protest against the emplo prehensible terms to indicate things the e was incapable of scientific proof.

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Mr. E. H. Pember, K.C.—He sympathi motives which had prompted Mr. Galton' paper. But he doubted whether any di be taken to bring about an improvement must desire. Indeed, what was asked little less than a wide distribution of sou ing to literary genius among the writers o This might be encouraged, but it could It would be impossible to establish a dire ship over productions which might be e though extremely ill-written. The write and the discouragement, still more the portant communications, would be too hi even for the luxury of a fine style. In ment of good composition would be prefe upon bad. It was the desire, he hoped it was the intention, of the Royal Society putting itself into communication with e throughout the kingdom, and possibly b

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> "Big fleas have little fleas upon their backs to bite 'em,
> And these again have lesser fleas, and so *ad infinitum*."

(Laughter.)

In this connection he desired entirely to associate himself with what he understood to fall from Sir Archibald Geikie, and to protest against the employment of incomprehensible terms to indicate things the existence of which was incapable of scientific proof.

Mr. Galton had, at the end of his paper, suggested that the shortcomings of the writers of scientific memoirs might now and then be published as a warning to others. He (Mr. Crackanthorpe) could not help thinking that this would be rather hard measure, even though no names were mentioned. He was quite sure that Mr. Galton himself, who was one of the most kind-hearted of men, would never lend himself to any such action. Would not his object be attained if the faulty memoir were returned to its author for revision, and this were, if necessary, repeated again and again until a flawless edition was reached? Then, when the memoir came to be published by the learned society to which it was presented, there would be nothing to offend the most fastidious ear.

Mr. E. H. Pember, K.C.—He sympathised fully with the motives which had prompted Mr. Galton's very suggestive paper. But he doubted whether any drastic steps could be taken to bring about an improvement which everybody must desire. Indeed, what was asked for amounted to little less than a wide distribution of something approaching to literary genius among the writers of scientific papers. This might be encouraged, but it could not be compelled. It would be impossible to establish a direct literary censorship over productions which might be extremely valuable though extremely ill-written. The writers would resent it, and the discouragement, still more the rejection, of important communications, would be too high a price to pay even for the luxury of a fine style. Indirect encouragement of good composition would be preferable to penalties upon bad. It was the desire, he hoped he might say that it was the intention, of the Royal Society of Literature, by putting itself into communication with educational centres throughout the kingdom, and possibly by other methods,

to do something substantial in that direction. It was too true that the present standard of prose style was somewhat decadent. When one compared the twentieth with the eighteenth century, the condition of our own epoch left much to be desired. To mention only a very few names, Hume in History, Blackwood in Law, Bishop Berkeley and Sir Thomas Browne in Philosophy, were all living proofs of the truth that profundity in thought and exactness in exposition were not only consistent with, but enhanced by, a clear and elegant style. In the nineteenth century Huxley, Darwin, Mill, and Macaulay were all examples of the same healthy combination. He expressed an opinion that the banishment of the classical languages from general education was one source of the evil, and he trusted that something might be done not only to retain, but to extend, the study of them. Meanwhile, towards the end desired, suasion, and not an aggressive censorship, must be acknowledged to be the working means.

Mr. Percy W. Ames, Secretary.—Mr. Galton has added one more to his many public services by calling attention to the need of improved literary form in the papers in which scientific discoveries are presented to the world. The practical suggestions he has made would, if adopted, make a general and considerable step in this direction, and immediately secure one desirable object. It is important that the Councils of the various societies should be informed whether the papers submitted for publication are clearly expressed, and so have the opportunity of rejecting or referring back those that are deficient in this respect, but unless a competent committee undertakes the laborious task of literary correction, in some cases practically re-writing the memoir, such rejection may result occasionally in the loss of valuable contributions. Sir Archibald Geikie has told us that in the Royal Society this report and correction are provided for. Mr. Galton has invited discussion on ways and means for securing a better literary style for such memoirs in the future, and has referred to the necessity for more adequate preliminary training, and on this point I venture to make an observation. It would not be practicable to require students of science to follow the best plan for acquiring a good style of composition, namely, to obtain a first-hand acquaintance with the classics of English literature, though such labour would bring its own reward. Time is short, the practical interrogation of Nature is

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absorbing; we must not expect investigators of physical phenomena to turn aside into the "quiet and still air," as Milton called it, of literary study, however delightful, and it is not necessary. The object is not to seek the elegance of an Addison or a Ruskin, still less the art of the poet, though something might be said in favour of imitating the attractive ease and simplicity of Charles Lamb, De Quincey, and Thackeray. The remedy I suggest as effective is not so foreign to the main purpose of the life-work of a man of science as the study of general English literature would be. It is simply to give more time and attention to the specific study of scientific method. Too often it is the case that the author of a badly written memoir is the "calculator of distances, or analyser of compounds, or labeller of species," and nothing more. Herbert Spencer claimed for the study of science that it exercises the memory with understanding, cultivates the judgment, continually appeals to individual reason, develops independence of character, requires perseverance and self-renunciation, contributes sincerity, and gives moral, intellectual, and religious culture.

All this is more than is wanted for the purpose in hand; but that exactness of statement and that simplicity of expression, which are desired, arise from clearness of thought and an orderly habit of mind, qualities which are developed by fidelity to the principles of scientific method. That these should be thoroughly understood by everyone engaged in scientific research will not be disputed, and they are best mastered by coming into close touch with the most eminent teachers through the works in which they have applied them. It should, I think, be made compulsory for every scientific student, irrespective of his specialty, to master one or more of the works of Darwin, Huxley, Tyndall, and Herbert Spencer. The discipline so afforded would soon reveal itself in more systematic thinking and in greater precision of expression.

Mr. EMANUEL GREEN, who presided in the unavoidable absence of the Earl of Halsbury, expressed the thanks of the meeting to Mr. Galton for his paper, and to Mr. Pember for reading it.