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THE CARNEGIE INSTITUTION AND THE PUBLIC[1]

RECIPROCITY OF RELATIONS

IT is often openly asserted and more often tacitly assumed that an endowed altruistic organization acting under a state or a national charter may proceed without restrictions in the development of its work. Thus, in accordance with this view, the institution is frequently congratulated on its supposed freedom from governmental control and on its supposed immunity from social restraint. But this view is neither consonant with fact nor consistent with sound public policy. All such organizations are properly subject not only to the literal constraints of their charters but also to the commonly more narrow though unwritten limitations imposed by contemporary opinion. The ideal to be sought by them in any case consists in a reciprocity of relations between the individual endowment on the one hand and the vastly larger and more influential public on the other hand. This ideal, however, like most ideals, is rarely fully attainable. Its existence and importance are, indeed, almost as rarely recognized. Hence, any new altruistic organization is apt to find itself oscillating between two extreme dangers: the one arising from action on the part of the organization prejudicial to public interests; the other arising from public expectations impossible of attainment and therefore prejudicial to the organization.

Happily for the institution, neither of these extreme dangers has been seriously

[1] Extract from the Report of the President of the Carnegie Institution, Washington, D. C., 1917.

encountered. Its evolution has proceeded without surpassing charter limitations and without permanent hindrance from an aggregate of expectations certainly quite unparalleled in the history of research establishments. But while thus far it has been practicable to steer clear of the rocks and the shoals toward which enthusiastic friends even of the institution would have it head, and to demonstrate the inappropriateness, the futility, or the impossibility of a large number of recurring suggestions for application of the institution's income, there remains a multitude of subjects and objects of omnipresent importunity for which the institution has furnished and apparently can furnish only general disappointment. Some references have been made occasionally in previous reports to these matters, but in general they have been ignored for the reason that they tend to waste energy in the production of nothing better than heat of controversy. A full enumeration and discussion of them would require nothing short of a volume, which would be of value probably only to our successors. There are two classes of them, however, presenting widely different aspects, which appear worthy of special mention in this connection and at the present unusual epoch in the intellectual development of mankind. These two classes find expression respectively in the perennial pleas of humanists for a larger share of the institution's income and in the more persistently perennial pleas of aberrant types of mind for special privileges not asked for, and not expected by, the normal devotees to learning.

CLAIMS OF HUMANISTS

Whenever and wherever the rules of arithmetic are ignored, then and there will develop vagaries, misunderstandings, and errors of fact that only the slow processes of time can correct. Hence it was not simply natural but necessary that in the evolution of the institution something like conflict surpassing the bounds of generous rivalry should arise between claimants whose aggregate of demands for application of income has constantly exceeded the endowment from which income is derived. Indeed, if the evidences of experience are to be trusted, there is scarcely a province in the world of abstract and in the world of applied knowledge which has regarded its needs as incommensurable with that entire income. It was an inevitable consequence, therefore, of inexorable conditions that a majority of the commendably enthusiastic workers in these numerous provinces should fail to get from the institution all the aid they desired. It was a similarly inevitable consequence of those conditions that some of these enthusiastic workers should attribute their disappointment to wrong causes. And it might likewise have been predicted with certainty that the largest share of the resulting disapprobation visited upon the institution should come from the province of the humanists, not because they possess any property of superiority, of inferiority, or any other singularity, but, firstly, for the reason that they are more numerous in the aggregate than the devotees of all other provinces combined; and, secondly, for the less obvious but more important reason that the subjects and objects of their province are more numerous, more varied, more complex, and in general less well defined than the subjects and objects of any other province.

Concerning all these matters humanistic which have agitated academic circles especially for centuries, the administrative office of the institution is naturally called upon to share in an extensive correspondence. Some of this is edifying, most of it

is instructive, but a large if not the greater part of it appears to have been relatively fruitless in comparison with the time and the effort consumed. Why is this so? Or, is it only apparently and not actually so? May it not be due to the proverbially narrow, or possibly "materialistic," tendencies sometimes attributed to administrative officers? Much attention has been given to these inquiries with a view to securing answers free from personal bias and independent of administrative or other ephemeral restrictions. Essentially correct answers are furnished, it is believed, by the voluminous correspondence referred to, since it has supplied the data required for application of the objective methods of observation and experiment as well as the data for application of the subjective methods of a priori reasoning and historico-critical congruity.

An appeal to that correspondence shows, in the first place, that there is no consensus of opinion amongst professed humanists as to what the humanities are. It is well known, of course, by those who have taken the trouble to reflect a little, that the words humanistic and humanist are highly technical terms, more so, for example, than the term "moment of inertia," the full mechanical and historical significance of which can only be understood by consulting Euler's "Theoria Motus Corporum Solidorum." Technically, the humanist is not necessarily humane, though fortunately for the rest of us he generally possesses this admirable quality; he needs only to be human. The distinction is well illustrated at one extreme by what Greg called the "false morality of lady novelists," which could doubtless be surpassed by the falser morality of male authors of fiction; and at another extreme by the merciful rôle of the physician in saving lives, or the equally merciful rôle of the engineer who builds bridges that will not fall down and kill folks, whose works, nevertheless, are often relegated by the humanist to the limbo of technology.

But these finer shades of verbal distinction which, with more or less elaboration, have come down to plague us from the days of the illustrious Alcuin and Erasmus, but with no such intent on their part, are less disconcerting than other revelations supplied by this expert testimony. It shows, in the second place, the surprising fact that some few humanists would restrict this field of endeavor to literature alone. From this minimum minimorum of content the estimates of our esteemed correspondents vary with many fluctuations all the way up to a maximum maximorum which would embrace all that is included in the comprehensive definition of anthropology to be found in the Standard Dictionary. Thus some eminent authorities would exclude from the humanities all of the ancient classics even, except their literatures. To such devotees philology, literary or comparative, has no interest; while archeology, classical or cosmopolitan, is of no more concern to them than comparative anatomy, which latter, by the way, is held in certain quarters to comprise the whole of anthropology. Equally confident groups of enthusiasts, on the other hand, animated by visions held essential to prevent our race from perishing, would, each in its own way, have the institution set up boundaries to knowledge within which the humanities, as always hitherto, would play the dominant part but whose appropriateness of fixation would be immediately disputed by other groups. There would be, in fact, only one point of agreement between them, namely, that the institution's income is none too large to meet the needs of any group. It

should be observed in passing, however, in fairness to our friends the humanists, that they are not alone in their regressive efforts to establish metes and bounds for advancing knowledge. Contemporary scientists have likewise pursued the same ignis fatuus with similarly futile results, as is best shown by the arbitrary and often thought-tight compartments into which science is divided by academies and royal societies. A sense of humor leads us to conclude that these likenesses between groups and assemblages thereof, still more or less hostile at times to one another, serve well to prove that the individuals concerned are human if not humanistic and that they all belong to the same genus if not to the same species.

In the third place, there is included in the extensive correspondence on which this section is mainly based a special contribution of letters furnished mostly by university presidents and professors and by men of letters selected with a view to excluding all those who might be suspected of any non-humanistic predilections. These letters were received as replies to a communication issued first during the year 1910, and occasionally since then, soliciting counsel from those well qualified to assist the institution in determining how it may best promote research and progress in the humanities and how it may be relieved of the charge of unfairness toward them in the allotment of its income. The essential paragraphs in this communication are the following:

> Amongst other suggestions arising naturally in this inquiry is that of the desirability of something like a working definition of the term humanities. To the question What are the humanities? one finds a variety of answers, some of which seem much narrower than desirable.
>
> In order to get additional information on this subject and in order to make this part of the inquiry as concrete and definite as possible, I am sending copies of the inclosed list of publications to a number of friends requesting them to mark those entries of the list which they, as individuals, would consider works falling properly in the fields of the humanities. I shall esteem it a great favor, therefore, if you will kindly examine this list, indicating by some sort of check-mark what works, if any, may be rightly so classed, and then mail the same in the inclosed stamped envelope. It will be of service also, to indicate to me, if you care to do so, the lines of distinction which may be drawn between the humanistic sciences and the physical sciences. I am sure you will agree with me that it will be a decided aid to all of us to secure something like common definitions for these boundaries of knowledge.

About thirty distinguished authors have participated in this symposium; and their frank and generous expressions of opinion would be well worthy of publication if they had not been assured that their responses would not be used for such a purpose. The identities and details of their letters must therefore be retained, for the present at any rate, in the archives of the institution. But since many of them have offered to relieve the solicitor of this obligation, and probably all of them would do so on request, it is believed that no confidence will be violated in stating the two following statistical facts, which not only agree with one another but strongly confirm also the inductions referred to above, drawn from the more miscellaneous correspondence of the institution:

1. The definitions of the term humanities vary from the exclusiveness of literature alone to the inclusiveness of the more recent definitions of anthropology, with a noteworthy tendency toward inclusiveness rather than the reverse.

2. To the concrete question What works, if any, already published by the institution fall in the humanities, the answers vary from 2 to 33, the number of publications up to 1910 being 146.

The correspondent who assigned the

largest number of publications to the humanities took the trouble also to count up the totals of the numbers of pages of all the works issued by the institution up to that time. His count gave: for the humanities, 10,813 pages; for all other branches of knowledge, 21,700 pages.

In connection with these statistical data, it is appropriate to add the corresponding figures for the publications of the institution brought down to date, namely, October, 1917. In deriving these there are included under the humanities works in archaeology, folk-lore, international law, history, literature, and philology. Of a total of 88 volumes, 58 octavos contain 19,921 pages and 30 quartos contain 10,718 pages, the total number of pages being 30,639; but four of the volumes are still in press and their pagination is not included.

Since the total number of pages of printed matter issued by the institution up to date is 98,565, it appears that the shares, if such a term may be used, allotted to the humanities and to all other fields of learning combined are in round numbers one third and two thirds respectively. Whether this is one of fairness and fitness will doubtless remain for a long time a disputed question, since it seems to be one to which the dictum of Marcus Aurelius applies with peculiar emphasis. In the meantime, while waiting for a diminution in the diversity of opinion which calls that dictum to mind, it appears to be the duty of the institution to proceed, as it has sought to proceed hitherto, in a spirit of sympathy and equity based on merit towards all domains of knowledge, with a full appreciation of the necessary limitations of any single organization and with a respectful but untrammeled regard for the views, the sentiments, and the suffrages of our contemporaries.

ABERRANT TYPES OF MIND

If words and phrases drawn out of the past may obscure thought and supplant reason in the domains of the less highly developed sciences, like the humanities, for example, they are by no means free from difficulties when used as media for the communication of ideas in the domains of the more highly developed sciences. The differences between the ambiguities and the obscurities of the two domains are mainly in degree rather than in kind. It is a truism, of course, that in general it is much easier to discover errors and to improve uncertain verbal expression in the definite than in the indefinite sciences. Erroneous statements and interpretations of fact may be often corrected by the facts themselves or by means of a knowledge of their relations to underlying principles. Precision and correctness of language are also greatly increased in any department of learning when it becomes susceptible to the economy of thought and of expression characteristic of the mathematico-physical sciences. The perfection of these latter is, indeed, so great that novices working in them are often carried safely over hazardous ground to sound conclusions without adequate apprehension of the principles involved and with only erroneous verbal terms at command to designate the facts and the phenomena considered.

Nevertheless, it must be admitted that the terminology of what commonly passes for science as well as the terminology used frequently even by eminent men of science is sadly in need of reformation in the interests of clear thinking and hence of unequivocal popular and technical exposition. To realize the vagueness and the inappropriateness in much of the current use of this terminology one needs only to examine the voluminous literature available in almost any subject called scientific.

It is so much easier to appear to write well, or even brilliantly, than it is to think clearly, that facile expression is often mistaken for sound thought. Thus, to illustrate, while in physics the terms force, power and energy have acquired technical meanings entirely distinct and free from ambiguity, they are commonly used as synonyms, and quite too commonly to designate properties, sentiments, and influences to which their application is meaningless. The "forces," the "powers," and more recently, the "energies" of "nature" are frequently appealed to in popular literature; and a familiar bathos consists in equipping them solemnly with the now vanishing stable furniture "for the benefit of mankind." Science is disfigured and hindered also by much inherited antithetical terminology for which reasons once existent have now disappeared or are disappearing. Instances are found in such terms as metaphysics, natural history, and natural science, the two latter of which appear to have come down to us without sensible modification, except for a vast increase in content, since the days of Pliny the Elder. The diversification and the resulting multiplication of meanings of the terms of science are everywhere becoming increasingly noticeable and confusing. One of the most recent manifestations is seen in the phrase "scientific and industrial research," which probably means about the same thing as the equally uncertain phrase "pure and applied science"; while both phrases have been turned to account in setting up invidious distinctions inimical to the progress of all concerned.

This looseness in the use of terminology inherited from our predominantly literary predecessors and the prevailing absence of any exacting standards of excellence in exposition make it easy for that large class here designated as aberrant types to take an unduly prominent part in the evolution of any establishment founded for the promotion of "research and discovery and the application of knowledge for the improvement of mankind." These types are numerous and each of them presents all gradations ranging from harmless mental incapacity up to aggressive pseudo-science, which latter often wins popular approval and thus eclipses the demonstrations of saner counsels. The representatives of these types are variously distinguished in common parlance as cranks, quacks, aliens, charlatans, mountebanks, etc. Some of the most persistent types are known as arc-trisectors, circle-squarers and perpetual-motion men and women. They are not of recent development; they are coextensive with our race; but they have been little studied except in the cases of extreme divergency from the normal. One important work, however, has been devoted to the intermediate types of this class with which the present section of this report is concerned. This is the profoundly learned book entitled "A Budget of Paradoxes,"[2] by Augustus De Morgan, who gave a surprising amount of attention, extending through several decades, to these people, whom he called "paradoxers."

It ought to be well known, but evidently is not, that the institution has had to deal with, and must continue to be harassed by, great numbers of these aberrant types. The happy phrase of the founder concerning the "exceptional man" has worked out very unhappily both for them and for the institution, since it has only inevitable disappointment to meet their importunate demands, while they in turn have only in-

[2] This was published originally in 1872. A second edition in two volumes, edited by Professor David Eugene Smith, has recently (1915) been issued by the Open Court Publishing Company, of Chicago and London.

evitable animadversion to visit finally upon the institution. Deluded enthusiasts and designing charlatans entertain alike the illusion that here at last is an establishment that will enable them to realize their wildest dreams of fame and fortune. But in the end the hopes of these people are either rudely shocked or wrecked, not because the institution would disturb them in their fancies but because they compel the institution to decline to approve their theories and to subsidize their projects. Many individuals of this class are extraordinarily clever, in literary capacity especially, although they are almost all notably deficient in critical faculties. In the initial stages of correspondence with them they are wont to attribute superhuman qualities to the administrative officer concerned, but if he becomes at all exacting they are wont to suggest a speedy degeneracy for him towards inhuman qualities. The absurdities, the arrogance and the audacity (often pushed to the extreme of mendacity) of their claims are generally ludicrous enough, but these claims are often founded also on recondite fallacies which present pathetic as well as humorous aspects. Two illustrations drawn from the older and hence more impersonal sciences may suffice to indicate the nature of the daily experience here in question:

1. A teacher of youth in a public school desires assistance in securing letters-patent for a new proof of the Pythagorean theorem. And why not, since we read every day in the public press and in the debates of legislative bodies of "principles" being patented?

2. Quite recently it has been "discovered" that the air and the ether contain "free energy." If this is so, if energy like urbanity is free, why should it not be rendered available at the expense of the institution for the improvement of mankind?

Study and reflection concerning these aberrant types and an intimate association with them beginning thirty years before the foundation of the institution, all point to the conclusion that responsibility for their undue prominence must be attributed in large degree and in the last analysis to a prevalent inadequate development of critical capacity even amongst the best educated classes of contemporary life. Many representatives of these latter regard the eccentric individual as thereby worthy of special attention. He is often referred to as a sprite or as a male witch, but commonly, of course, under the more familiar designations of our day as "a genius" or as "a wizard." Thus it is quite easy for obvious charlatans and ignoramuses, as well as for those in pursuit of Sisyphean paralogisms and anachronisms, to secure letters of introduction and commendation to the institution from distinguished people, who pass the applicants along on the theory apparently that no harm can result from an effort to assist in the laudable work of extending learning. It is assumed that a research establishment must have effective facilities for utilizing the necromantic capacities attributed to those in particular to whom the terms genius and wizard are by common assent applied. Such introductions and commendations are generally held to be equivalent to approvals which may not be lightly set aside. The suggestion of tests of the pretensions and of checks on the deductions of these applicants is repulsive to them. What they desire is not diagnosis but indorsement. In all these matters there is revealed likewise a widely diffused misapprehension concerning the meanings of the terms science and research. The first may mean anything from occultism to the steam engine or to the telephone and thence up to those rarely appreciated principles of which

the law of conservation of energy is one of the most conspicuous examples. The other term has a similarly wide range of meaning, but it stands most commonly either for a secret process which leads to riches by way of patent offices or for enterprises in which the institution is supposed to act as a complaisant disbursing agency.

In dealing with these aberrant types there are encountered certain other fallacies of a more specious and hence of a more troublesome character. They arise out of the prevailing innocence of, if not contempt for, the doctrine of probabilities. The simplest of these fallacies is seen in the common belief that one mind is as likely as another to make discoveries and advances in the realms of the unknown. Thus it is assumed that research establishments should maintain experts, or corps of them, for the purpose of promoting the efforts of tyros, amateurs and dilettanti, or, in other words, perform the functions of elementary schools. A subtler fallacy is expressed in the more common belief that a research organization should occupy itself chiefly in soliciting and in examining miscellaneous suggestions. It is held that if these are received in large numbers and if they are read long enough and hard enough, the possibilities of knowledge will be completely compassed. This has been elsewhere called the process of "casting dragnets in the wide world of thought . . . with the expectation that out of the vast slimy miscellanies thus collected there will be found some precious sediments of truth." It is, indeed, a metaphysical method of extracting truth out of error. The worst of all these fallacies is found in the not unpopular notion that if experts could be set at work under the direction of inexperts great progress could be achieved. This is the fallacy so often used to justify placing technical work under the administration of politicians and promoters rather than under the charge of competent men. It finds frequent expression also in suggestions to the institution that its corps of investigators might avoid the dangers of "respectable mediocrity" by yielding to the requests of the less conservative and more brilliant advocates of advancing knowledge.

But what, it may be asked, are the characteristics which differentiate these pseudo-scientists from normal investigators? They are well defined and not numerous. The pseudo-scientist is in general excessively egoistic, secretive, averse to criticism, and almost always unaware of the works of his predecessors and contemporaries in the same field. He displays little of that caution which is born of adequate knowledge. He is lacking especially in capacity to discover and to correct his own mistakes. He is forever challenging others to find errors in his work. He has an overweening confidence often in formal logic, but is unable to see that this useful device may play tricks by bringing him, for example, simultaneously to right and to wrong conclusions by reason of wrong premises. His worst defect is manifested in asking for and in expecting to get more lenient consideration in the forum of demonstration than that accorded to his more modest but more effective competitors.

How inadequate are the hasty popular estimates of these exceptional individuals is sufficiently witnessed in the extensive experience of the institution. In the brief interval of its existence it has had to deal with about 12,000 of them. Many of these have been commended to the institution in terms well calculated to set aside the laws of biologic continuity and thus to elevate the aspirants abruptly from irreproachable respectability to questionable fame. To some of them have been attributed quali-

ties worthy of the mythological characteristics conceived by the unrestrained imaginations of men in prescientific times. Not a few of them have proved to be obvious fakers, schemers or incompetents masquerading in the name of learning with the confident expectation that the institution would indorse, finance or otherwise promote their objects under the guise of research. But, as might have been predicted, the history of all this varied experience is a history of futility clouded here and there by manifestations of the baser traits of mankind and lighted up only occasionally by flashes of wit, wisdom or humor in the prevailing pathologic cast.

ROBERT S. WOODWARD

SCIENTIFIC EVENTS

CONJOINT BOARD OF SCIENTIFIC STUDIES IN GREAT BRITAIN

THE first annual report of the Conjoint Board of Scientific Studies, established at the instance of the Council of the Royal Society in June, 1916, has been issued. As reported in the *British Medical Journal,* the objects of the board are to promote the cooperation of those interested in pure or applied science; to supply means by which the scientific opinion of the country on matters relating to science, industry and education, may find effective expression; to promote the application of science to industries and the service of the nation; and to discuss scientific questions in which international cooperation seems advisable. The chairman of the board, which consists of representatives of numerous societies, is the president of the Royal Society. Among the constituent societies are the Royal Anthropological Institute, the Royal Colleges of Physicians and Surgeons in England, the Royal Society of Medicine, the Pharmaceutical Society of Great Britain, the Psychological, Linnean, Zoological, Biochemical, and Psychological Societies, the Institute of Chemistry, the Society of Chemical Industry, the Chemical Society, and the Royal Institute of British Architects. There is a small executive committee, of which Sir Joseph J. Thomson, president of the Royal Society, is chairman, and Dr. W. W. Watts, professor of geology in the Imperial College of Science and Technology, secretary; among the other members are Sir Alfred Keogh and Sir Ray Lankester. The board has appointed a number of sub-committees, some of which appear to have got to work during the year, including The International Catalogue Subcommittee which has obtained information regarding the extent of the use made by scientific men of the present International Catalogue of Scientific Literature; the Watching Subcommittee on Education, of which Sir Ray Lankester is convener, the Metric System Subcommittee, and the Anthropological Survey Subcommittee. The last named consists of Major Leonard Darwin (convener), Professor A. Keith (secretary), Dr. James Galloway, Dr. P. Chalmers Mitchell, and Professors G. Elliot Smith, Karl Pearson and Arthur Thomson. It has presented a report on the need of a physical survey of the British people, and intends to institute further inquiries before drafting recommendations. On its advice the executive committee asked the Board of Education, the Local Government Board, and the Registrar-General's Office to nominate representatives on the subcommittee, and Sir George Newman, Sir Arthur Newsholme, and Dr. T. H. C. Stevenson, have been appointed. The Watching Subcommittee on Education has held a conference with the Council of Humanistic Studies, and has made a report to the Conjoint Board, in the course of which it recommended that both natural science and literary subjects should be taught to all pupils below the age of 16, and that afterwards specialization should be gradual and not complete. It points out that in many schools of the older type more time, which can often be obtained by economy in the time allotted to classics, is needed for instruction in natural science, but that in many schools more time is needed for instruction in languages, history and geography. The opinion is also expressed that while it is impossible and undesirable to provide instruction in both Latin and Greek in all secondary