



# Darwin, Bacon, and Research in Librarianship

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“WHEN ON BOARD THE H.M.S. ‘BEAGLE,’” wrote Charles Darwin in the introduction to *The Origin of Species*, “. . . I was much struck with certain facts in the distribution of the organic beings inhabiting South America, and in the geological relations of the present to the past inhabitants of that continent.”<sup>1</sup> Darwin surmised that these facts might throw some light on “. . . that mystery of mysteries, . . .”<sup>1</sup> the origin of species. Therefore, upon his return home, he began his inquiry “. . . by patiently accumulating and reflecting on all sorts of facts which could possibly have any bearing on it.”<sup>1</sup> First he turned to that which was immediate—the plants and animals of the farm and barnyard—and comparing them with their kind “. . . in a state of nature; . . .”<sup>2</sup> he reflected that the lesser variability to be observed in the wild might be “. . . due to our domestic productions having been raised under conditions of life not so uniform as, and somewhat different from, those to which the parent species had been exposed under nature.”<sup>3</sup>

Here we cannot, of course, trace out in its entirety the thread of Darwin’s argument, though it would be most instructive so to do, for in it is to be seen the almost perfect representation of the research process. Darwin was probably not aware that he had embarked on “research”—though in his *Autobiography* he speaks of his mind as “. . . a kind of machine for grinding general laws out of large collections of facts . . .”,<sup>4</sup>—or that he was engaged in any recondite enterprise. He was simply following the admonition of Francis Bacon, from whose *Advancement of Learning* he quotes on one of the fly-leaves of the *Origin*:

*“To conclude, therefore, let no man out of a weak conceit of sobriety,*

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*or an ill-applied moderation, think or maintain, that a man can search too far or be too well studied in the book of God's word, or in the book of God's works; divinity or philosophy; but rather let men endeavour an endless progress or proficience in both."*

He also quotes from Whewell's *Bridgewater Treatise*:

*"But with regard to the material world, we can at least go so far as this—we can perceive that events are brought about not by insulated interpositions of Divine power, exerted in each particular case, but by the establishment of general laws."*

Shorn of its mysticism and its methodology, research since (at least) the time of Bacon has been an answering of questions by the accumulation and assimilation of facts which lead to the formulation of generalizations or universals that extend, correct, or verify knowledge.

One cannot talk about the philosophy of modern research without going back to Bacon, for every serious investigator of natural and social phenomena since the seventeenth century is deeply indebted, consciously or unconsciously, to Baron Verulam, Viscount St. Albans. But Bacon's insistence upon strict application of the experimental method for discovering the facts of nature has now been so fully absorbed into modern scientific practice, and has become so commonplace with the passage of time, that one is apt to forget that Bacon was really protesting the *haphazard* accumulation of observation. He knew, of course, that experimentation had been practiced long before his time; but, as he wrote, ". . . the manner of making experiments which men now use is blind and stupid . . . wandering and straying as they do with no settled course, and taking counsel only from things as they fall out, they fetch a wide circuit and meet with many matters, but make little progress. . . . [They] make their trials carelessly, and as it were in play . . ." <sup>5</sup> The true research worker does not embark on a fishing expedition. Chemists do not make random mixtures to see what will happen, nor do biologists thrust under their microscopes the first living organism that comes to hand. Experimentation comes after hypothesis, not before it. Indeed, one can agree with Pierce Butler that ". . . there is no such thing as scientific research until a theoretical hypothesis has been formulated." <sup>6</sup> To be sure, Darwin's curiosity was aroused by his observations of variety in species, but he did not begin his systematic study of its manifestations in domestic animals and plants until he had hypothesized the outcome of his inquiry.

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But it was Bacon who established the pattern. "For hitherto," he wrote, "the proceeding has been to fly at once from the sense and particulars up to the most general propositions, . . . my plan is to proceed regularly and gradually from one axiom to another, so that the most general are not reached till the last. . . ." <sup>7</sup> Again, he wrote in one of his most famous passages, "The men of experiment are like the ant; they only collect and use: the reasoners resemble spiders, who make cobwebs out of their own substance. But the bee takes a middle course; it gathers its material from the flowers of the garden and of the field, but transforms and digests it by a power of its own." <sup>8</sup> Clearly, to be an effective research investigator one must resemble the bee—purposeful, industrious, and imaginatively selective in the assembling of evidence.

Moreover, for an inquiry to qualify as true research, its results must be generalizable. Darwin's work had implications, applications, and consequences far beyond the boundaries of biology, and Bacon well knew that "axioms rightly discovered . . . [will] draw after them trains and troops of works." <sup>9</sup>

This criterion that the results of investigation must be generalizable raises again the age-old problem of pure as opposed to applied research. The fallacy of the dichotomy rests in the assumption that these terms are absolutes, that they are discrete. Research is no less "pure" for leading to useful results, though it most certainly does not have to possess immediate applicability to qualify as research. Bacon, the practical politician and public figure, was suspicious of the tendency of human beings to engage in the artificial kind of speculation that leads nowhere; he wanted all scientific activity to be well established on the bedrock of concrete problems: ". . . On account of the pernicious and inveterate habit of dwelling on abstractions, it is safer to begin and raise the sciences from those foundations which have relation to practice. . . ." <sup>10</sup> Yet Bacon was not unmindful of the value of those inquiries which have no immediate applicability, but represent the pursuit of knowledge for its own sake: Science should be willing to carry out ". . . a variety of experiments, which are of no use in themselves, but simply serve to discover causes and axioms; which I call '*Experimenta lucifera*,' experiments of light, to distinguish them from those which I call '*fructifera*,' experiments of fruit." <sup>11</sup> Such experiments possess the great advantage that ". . . they never miss or fail. For since they are applied, not for the purpose of producing any particular effect, but only of discovering the natural cause of some

effect, they answer the end equally well whichever way they turn out; for they settle the question."<sup>11</sup> Man can maintain his domination over nature only by understanding the secrets of nature without regard to immediate and practical ends. "Truth therefore and utility are here the very same things: and works themselves are of greater value as pledges of truth than as contributing to the comforts of life."<sup>12</sup>

Thus from both Darwin and Bacon we learn that research in its generic sense is much more than a method or system of methods, a technology, or a body of practice. Though it may involve any one or all of these, it is not defined by them alone. Nor is it to be equated with invention, with which it is so frequently confused by the layman. It is an intellectual act that begins with the asking of a question (emerging from an awareness of one's ignorance) and progresses through the critical examination of evidence that is both relevant and reliable to the revelation of truth that is generalizable and universal. Its goal is the perfectability of human knowledge through the pursuit of truth, a goal that can never be attained, but which must always be assumed to be attainable. The more deeply we penetrate into the nature of the atom, Enrico Fermi once observed, the more we are aware that Nature always keeps two jumps ahead of us. He was saying, albeit graphically, no more than that the search for knowledge is interminable, that it has no end, that there is always some place else to go. This is not the counsel of despair, but a challenge to initiative.

Described in terms of its sequential acts, research is an intellectual process whereby a problem is perceived, divided into its constituent elements, and analyzed in the light of certain basic assumptions; valid and relevant data are collected; hypotheses (if any) are through objective testing, rejected, amended, or proved. The generalizable results of this process qualify as principles, laws, or truths that contribute to man's understanding of himself, his works, or his environment. Stated another way, research is the systematic attempt to discover new facts or sets of facts, or new relationships among facts, through the formulation of a preliminary explanation or hypothesis which is subjected to an appropriate investigation for validation or disproof.

The only rule that governs research is the rule of objectivity. Research is the stern disciplinarian that it is, not because it is recondite or esoteric, but because it leaves no place for the subjective. Yet it is pursued by human beings who are themselves inescapable complexes of both reason and emotion, and in research the latter must be suppressed if the former is to prevail. Reasoning or observation that is

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diluted with emotion becomes sophistry or dogma. We submit that these are particular threats to research in librarianship, for librarianship is dominantly a service, and a service is always in jeopardy from emotion. *The librarian means to do good, and by dint of self-sacrifice and hard work he does what he means to do, and therefore that which he does is good.*

It was Ralph A. Beals who categorized library literature into the tri-partite classification of Glad Tidings, Testimony, and Research, finding precious little of the last.<sup>13</sup> This poverty of research in librarianship was explained by C. C. Williamson, in an address delivered at Western Reserve University in 1930 and subsequently published as the opening essay of the first issue of the *Library Quarterly*, as a consequence of the fact that librarians are basically empiricists, untrained in research and the scientific method. There exists, he charged, “. . . a deep-rooted prejudice among library workers against subjecting their activities to scientific scrutiny.”<sup>14</sup> This was undoubtedly the attitude of the typical librarian in 1930, and there is still much of it today. Research is emotionally disquieting, it does question old beliefs and sweeps aside tradition, often leaving in its wake disbelief, uncertainty, and shattered ideals.

Yet, despite the librarians' conventional antipathy for research, at the University of Chicago in the decade of the 1930's, some progress was made in laying a solid foundation for the application of research to the library as a social invention. Pierce Butler attempted to formulate the principles of a science of librarianship; Carleton Joeckel encouraged studies in the application of the techniques of scientific management and administration to the operation of libraries; William Randall focused the attention of his students upon the application of theories of the organization of knowledge to principles of library classification and bibliographic organization generally; Douglas Waples went beyond librarianship to the fundamental problem of the social effects of reading. And Dean Louis Round Wilson set forth, in *The Geography of Reading*, the social, cultural, economic, and other environmental influences related to the geographical distribution of libraries and library resources.

The advent of the Second World War exerted two powerful influences upon research in librarianship. First, it abruptly terminated the developments at Chicago by dispersing the faculty, and from this interruption the program initiated by Wilson and his colleagues never really recovered. Second, the War raised research in general to such a

high level of prestige, and rewarded its practitioners with such rich endowments, that librarianship was forced into a form of activity which had been largely alien to the profession and for which librarians generally were certainly unprepared. To this pressure for research, librarians responded in a variety of ways, and most of them hastily devised and ill-considered. The library schools began to talk glibly of research and to establish courses and seminars in library research and research methods. They substituted for the fifth-year bachelor's degree the degree of Master of Science in Library Science, and they rushed all unawares into doctoral programs. Wanting desperately to "do research," they looked to such fund-granting agencies as the Federal government and the foundations, and the response to their applications was surprisingly generous. Dollar diplomacy came to librarianship, with research as the key by which the coffers of wealth were to be unlocked. One can scarcely blame the librarians—even a starving man will founder if his normal diet is not restored by degrees, and librarians had been hungry for a very long time.

Because research had for so long been foreign to librarianship, when librarians did take the plunge, they became over-enthusiastic converts to method. Librarians, as John Livingston Lowes once wrote of the humanists, tended ". . . to become enamored of the methods, and at times to forget the end; to allow, in a word, the fascination of the means to distract [them] from the very object for which they are employed."<sup>15</sup> Because librarianship used as a model the methods of social science research, it relied so heavily upon statistics that, for a time, research in librarianship came to mean, almost inevitably, statistical investigation; and the value and significance of a research project came to depend upon the demonstrated degree of skill in statistical manipulation.

Because the methods and techniques of librarianship itself had been empirically derived, it is not surprising that research in librarianship was also empirical at first. As a result, much library research has been little more than what Beals called "testimony," the implications of which are almost always personal and hence likely to be idiosyncratic. The evidence offered in support of testimony is experience, usually undifferentiated experience consisting of impressions and appraisals of complex phenomena by those whose predispositions tend to favor *ex parte* conclusions.

While in some situations valid experience rightly interpreted can contribute to the research process, yet of much library research one

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cannot but wonder whether the process of winnowing the data has been carried far enough to yield wholly trustworthy results; whether the size and character of the sample are such that the results can be reliable; whether the reporters of the data were skilled analysts and observers; whether conditioning factors had been isolated and appraised with accuracy; whether central tendencies had been slighted in favor of the picturesque, the unusual, or the fortuitous; and finally, whether the conclusions reached would be respected by qualified authorities. To be sure, for the solution of many stubborn library problems, undifferentiated experience is the only source of information available to the investigator, but it requires careful scrutiny and judicious appraisal if it is not to be misleading.

Because of the empirical character of library research, and its excessive dependence upon local observations and limited data, more frequently than not it is provincial and parochial rather than general in applicability. In the terminology that Douglas Waples was wont to use, such investigations tend to be "service studies" rather than true research. Not without some justice has the librarian's preoccupation with the trivial brought down upon him the ridicule of the Arthur Bestors and the condemnation of the Abraham Flexners. Yet librarians cannot be entirely condemned for the quantification of localized experience—into that trap the social sciences fell before them, and even the physical sciences were by no means immune to the lure of counting masquerading as objectivity. In 1906, the University of Chicago catalog observed, ". . . it seems probable that most of the grand underlying principles [of physics] have been firmly established, and that future advances are to be sought chiefly in the rigorous application of these principles to all the phenomena which come under our notice. It is here that the science of measurement shows its importance. . . ." <sup>16</sup> An eminent physicist has remarked that the future truths of Physical Science are to be looked for in the sixth place of decimals. In short, all scientific inquiry, at one stage or another in its journey toward a valid scientific method, has been guilty of that error to which Bacon pointed: the fallacy of investigating ". . . the nature of any thing in the thing itself. . . ." <sup>17</sup>

"To restore to intellectual life," writes Arthur Bestor in the *Restoration of Learning*, "the unity that the forces of modern life are threatening to destroy constitutes one of the most significant tasks to which thoughtful men and women are addressing themselves today." <sup>18</sup> In the modern world of research, the cooperation of scholars and sci-

entists from a variety of disciplines in a team attack upon problems of great complexity is one of the most distinctive and important features. Though (as Hertz and Rubenstein<sup>19</sup> have pointed out in their pioneering study of team research) the research process itself is as old as the history of man, and though the incessant striving for *system* in the solution of problems has evolved the *scientific method* as it is understood today, the recent introduction of team research represents *organization* for the purpose of reducing the uncertainty of outcome and minimizing the possibility of failure. Team research, then, born of man's continually growing awareness of the complex interrelationships within the world of knowledge and the interdependence of phenomena, stands as tacit admission of the essential unity of the research process. Because librarianship itself is concerned with all human knowledge, the use of interdisciplinary team research for attack upon library problems is especially important and promising. One can identify off-hand a number of areas in which library research could profitably seek assistance from other branches of intellectual activity:

1. Library administration—political science, government, management theory, operations, research, systems analysis, personnel management, budgeting.
2. Knowledge and society—epistemology, cultural anthropology, social psychology, communication research, social organization, philosophy, library criticism.
3. Education and communication—the structure and operation of the brain, psychology, the assimilation and utilization of information, linguistics, the new media, educational theory, communication theory.
4. Man-machine relationships—automation, cybernetics, information science and systems, logic, theory of classification, scientific method, structural linguistics.

The areas here designated are intended to be no more than suggestive; certainly they are not definitive. They may, however, serve to indicate the opportunity for enrichment of research in librarianship through synthesis with other disciplines, some of which are themselves quite new and as yet not fully formalized. One should also point out that in certain areas (e.g. the neuro-physiological), the librarian can do little but evaluate the findings of others in terms of their relevance to his professional responsibilities.

A profession that would know itself—that would anticipate or, to

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use Dennis Gabor's phrase, "invent the future"<sup>20</sup>—must support and engage in productive research. But research, important as it is, is not the be-all and end-all of human life, or even of human professional life; and every librarian does not have to be a "researcher" in order to prove the hairy-chested masculinity of the profession. Research is too important to be left to dilettantes and amateurs, and its pursuit should be reserved for those who are qualified for it by aptitude, education, and motivation.

### *References*

1. Darwin, Charles. *The Origin of Species*. New York, Modern Library, n.d., p. 11.
2. *Ibid.*, p. 13.
3. *Ibid.*, p. 15.
4. Darwin, Charles. *Autobiography. Life and Letters*. London, Murray, 1887, Vol. 1, p. 101.
5. Bacon, Francis. *Novum Organum*. In Popular Edition, Based Upon the Complete Edition of Spedding, Ellis, and Heath, *The Works of Francis Bacon*. Boston, Houghton, Mifflin and Company, n.d., p. 100.
6. Butler, Pierce. *An Introduction to Library Science*. Chicago, The University of Chicago Press, 1933, p. 108.
7. Bacon, *op. cit.*, p. 42.
8. *Ibid.*, p. 131.
9. *Ibid.*, p. 101.
10. *Ibid.*, p. 169.
11. *Ibid.*, p. 135.
12. *Ibid.*, p. 157.
13. Beals, Ralph A. "Implications of Communications Research for the Public Library." In Douglas Waples, ed., *Print, Radio, and Film in a Democracy*. Chicago, University of Chicago Press, 1942, pp. 165-167.
14. Williamson, C. C. "The Place of Research in Library Service," *Library Quarterly*, 1:10, Jan. 1931.
15. Lowes, John Livingston. "The Modern Language Association and Humane Scholarship," *PMLA*, 48:1403, Supplement 1933.
16. The University of Chicago. *Annual Register: July, 1905-July, 1906*. Chicago, The University of Chicago Press, n.d., p. 245.
17. Bacon, *op. cit.*, p. 123.
18. Bestor, Arthur. *The Restoration of Learning*. New York, Alfred A. Knopf, 1955, p. 58.
19. Hertz, David B., and Rubenstein, Albert H. *Team Research*, New York, Columbia University Department of Industrial Engineering, 1953.
20. Gabor, Dennis. *Inventing the Future*. New York, Alfred A. Knopf, 1964.

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