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Edmund Vincent Cowdry and the Making of Gerontology as a Multidisciplinary Scientific Field in the United States

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Abstract. The Canadian–American biologist Edmund Vincent Cowdry played an important role in the birth and development of the science of aging, gerontology. In particular, he contributed to the growth of gerontology as a multidisciplinary scientific field in the United States during the 1930s and 1940s. With the support of the Josiah Macy, Jr. Foundation, he organized the first scientific conference on aging at Woods Hole, Massachusetts, where scientists from various fields gathered to discuss aging as a scientific research topic. He also edited *Problems of Ageing* (1939), the first handbook on the current state of aging research, to which specialists from diverse disciplines contributed. The authors of this book eventually formed the Gerontological Society in 1945 as a multidisciplinary scientific organization, and some of its members, under Cowdry's leadership, formed the International Association of Gerontology in 1950. This article historically traces this development by focusing on Cowdry's ideas and activities. I argue that the social and economic turmoil during the Great Depression along with Cowdry's training and experience as a biologist – cytologist in particular – and as a textbook editor became an important basis of his efforts to construct gerontology in this direction.

Keywords: aging, cytologist, Edmund Vincent Cowdry, gerontology, multidisciplinary scientific field, *Problems of Ageing*, textbook editor, the Gerontological Society, the Great Depression

The Canadian–American cytologist Edmund Vincent Cowdry (1888–1975) made a significant contribution to the development of gerontology, the science aging. While many intellectuals had discussed and studied aging for a long time, it became a subject of a more concerted and organized approach by professional scientists during the first half of the twentieth century, and Cowdry played a leading role in this

development in the United States and other countries.[1] He organized, with the support of the Josiah Macy Jr. Foundation, the first scientific conference on aging in 1937 at Woods Hole, Massachusetts. The scientists who gathered there contributed to the publication of *Problems of Ageing: Biological and Medical Aspects* (1939) which contained a comprehensive survey of current scholarship on the problem in various disciplines. As the editor of this volume, Cowdry encouraged the contributors to join the "Club for Research on Ageing," an informal discussion group consisting of approximately twenty scientists. In 1945, core members of this Club established the Gerontological Society, Inc. which changed its name to the Gerontological Society of America (GSA) in 1981. He also played a major role in organizing the International Association of Gerontology and served as its second president.

As historian W. Andrew Achenbaum and sociologist Stephen Katz have pointed out, these pioneering works by Cowdry contributed to the rise of gerontology in America as a *multidisciplinary* scientific field pursued by many eminent scientists with distinct academic training and norms.[2] The Gerontological Society opened its membership to scholars in various fields, including biology, clinical medicine, psychology, and the social sciences. *The Journal of Gerontology*, the first official journal of the Society, also accepted research articles from diverse disciplines. The National Institute on Aging is another body that supports both biomedical and social scientific approach to senescence.

In this article, I trace the birth and development of multidisciplinarity of American gerontology by focusing on Cowdry's thoughts and activities. Admittedly, multidisciplinarity is a controversial notion which is often used interchangeably with "interdisciplinarity" or "transdisciplinarity."[3] The scholars who constructed gerontology argued that the science of aging should be a field of multiple disciplines, which maintained close cooperative relationships with one another, just as the atomic bomb project during World War II was a closely integrated effort of physicists, engineers, and military personnel.[4] Yet later scholars have thought that such a close integration and cooperation has not been feasible in gerontology, although many have thought that it is

[1] See Achenbaum, 1995, pp. 52–89; Katz, 1996, pp. 93–103; Landecker, 2007; Freeman, 1984; Birren, 1979, pp. 75–76; Lansing, 1975.

[2] Achenbaum, 1995, pp. 52–89; Katz, 1996, pp. 93–103.

[3] For a sociological analysis of multi/inter/trans-disciplinarity, see Klein, 1990, pp. 55–73.

[4] Korenchevsky, 1952, p. 376; Shock to Fremont-Smith, undated, Box 42, Folder 8, EVC.

increasingly becoming possible. It is even said that gerontology is an applied field for helping the aged rather than a formal scientific discipline, since it has few paradigmatic theories or methodologies which are shared by every member in the field.[5] Sociologist Julie Klein has described the nature of multidisciplinarity shown in these descriptions – it merely "signifies the juxtaposition of disciplines … essentially additive, not integrative."[6] In this article, I argue that while the later scholars' accounts of gerontology do reveal some aspects of its current state, they fail to show what the early gerontologists actually did. Although the cooperation among physicists, engineers, and military personnel for constructing the atomic bomb was quite different from what gerontologists could do at that time, they nevertheless tried to develop their field in that direction and were successful in a large measure. The early gerontologists, many of whom were contributors to Cowdry's *Problems of Ageing*, shared a broad social concern for the elderly and helped other researchers from different fields during their research and writing on aging. Eventually, the gerontologists formed professional societies through which they discussed various aspects of senescence across disciplinary boundaries. I argue that the multidisciplinarity of early gerontology shown in this series of developments could hardly be called an "additive" "juxtaposition of disciplines." Interestingly, Cowdry and other early gerontologists, many of whom came from biology and medicine, decided to include sociologists, anthropologists, and psychologists as well in their organization. The inclusion of these scholars in gerontology was not anticipated by earlier researchers of aging, particularly the Russian zoologist Elie Metchnikoff, who coined the term, "gerontology" in 1903.[7]

In this article, I argue that Cowdry's training and experience as a biologist – particularly as a cytologist – and as a textbook editor guided his endeavor to construct gerontology in this direction, especially amid the Great Depression. First of all, I show that his interaction with a number of eminent contemporary American biologists became a basis of his efforts to make gerontology a multidisciplinary field and to include sociological and psychological approaches as well biology and

[5] For the contemporary examinations of the status of gerontology as a discipline and/or profession, see Katz, 1996, pp. 104–119. Katz' book cites the following references. See Bramwell, 1985; Hirschfield and Peterson, 1982; Peterson, 1987.

[6] Klein, 1990, p. 56. But Klein classifies gerontology as an *interdisciplinary* field, which has been made through more integrative teamwork among disciplines. See Klein, 1990, p. 44.

[7] Metchnikoff, 1903, p. 386. For his introduction to "Gérontologie," see ibid., pp. 294–339.

medicine in his new scientific field. In particular, I argue that the problems of aging that emerged during the Depression stimulated him to practice what he learned from these biologists and to garner cooperation from these and other scholars. I also point out that his experience in editing textbooks – including *General Cytology* (1924) and *Special Cytology* (1928) – provided the model of the actual implementation of this cooperation.[8]

Indeed, the common experience Cowdry and his biologist colleagues shared reveal how and why he made efforts to establish gerontology as a scientific field. Cowdry's teachers and friends – including Walter Cannon (1871–1945), Herbert Spencer Jennings (1868–1947), Edwin Conklin (1863–1952), and Charles Judson Herrick (1868–1960) – belonged to the generation that experienced race riots, World War I, and the rise of fascism and communism during the early twentieth century.[9] As Sharon Kingsland and other historians have argued, these biological scientists, worried deeply about such political turmoil, tried to offer a new vision of social betterment through the knowledge gained from their research on living organisms that solved their own problems through intimate cooperation and ingenious and dynamic social organization.[10] Cowdry conceptualized the problem of aging in a similar way, after he came in contact with his teachers and colleagues at the University of Chicago, where he received his Ph.D. degree, and at Woods Hole, Massachusetts, where many American biologists regularly gathered for cooperative research and leisure activities.[11] Through his training and research there, Cowdry came to think that while elderly people were suffering from social isolation and economic hardships due to the enhanced age discrimination and destruction of private pensions during the Depression,[12] the aged cells in the body were still actively contributing to the survival of the whole as its important members.[13] Therefore, Cowdry thought, it was necessary to devise the ways to promote the welfare and social participation of the elderly following the

[8] This is briefly mentioned in Achenbaum, 1995, p. 63; Katz, 1996, pp. 97–103; Landecker, 2007.

[9] In this, sense, they belonged to what sociologist Karl Mannheim has labeled the "generation-unit." See Mannheim, 1952.

[10] Kingsland, 1991, pp. 195–230; Cross and Albury, 1987; Mitman, 1992.

[11] Pauly, 2000, pp. 145–164; Maienschein, 1991.

[12] On the problem of aging during the Depression in relation to the establishment of the Social Security Act, see Achenbaum, 1978, pp. 127–141, 1986, pp. 13–37.

[13] What Cowdry saw in the cell community was similar to the "generational contract" highlighted in the recent literature on generational conflict issue. See Bengtson and Achenbaum, 1993; Walker, 1996.

wisdom of the body's cellular community. Cowdry and his colleagues constructed gerontology as an important means to do so, at the same time as bureaucrats and politicians established and developed the Social Security Act during and after the 1930s.

The actual means of constructing gerontology in its early years came from Cowdry's experience in textbook editing that began during his research at Woods Hole. Indeed, historians have recently discussed science textbooks as an important agent of constructing disciplines and their practices under various social, political, and pedagogic constraints.[14] I argue that the multiauthored textbooks and their editorial process offered the framework of building gerontology when few people knew how this new science should be organized.[15] Cowdry came to take the editorship of his textbooks while participating in the American biological community at Woods Hole and other places. There he recruited the contributors to his cytology textbooks from various subspecialties in biology, and successfully encouraged interaction and cooperation among them during editorial process. Cowdry continued this editorial work in an advanced manner to produce *Problems of Ageing*, whose contributors, despite distinct backgrounds and institutional affiliations, were able to discuss senescence in a cooperative manner. Although there were certain conflicts, and some of the authors were not very concerned about what others studied, the contributors, through editorial process, came to feel that their cooperation would eventually help to solve the problems of aging, which were considered highly complex and multidimensional issues. While these authors remained as specialists in their own fields, they gradually began to think that they also belonged to a new field, gerontology. This, I argue, was the beginning of the multidisciplinary science of aging in the United States.

Chicago, Woods Hole, Cytology, and the Art of Editorship, 1909–1932

Cowdry was born in MacLeod, Alberta, Canada in 1888 and earned his bachelor's degree at the University of Toronto in 1909. He then went to the University of Chicago to study anatomy and cytology with

[14] For historical works on the roles of science textbooks and pedagogy, see Lundgren and Bensaude-Vincent, 2000; Warwick, 2003; Kaiser, 2005a, pp. 253–279, b.

[15] I do not argue that Cowdry initiated the tradition of multiauthored textbooks. Textbooks written by multiple contributors had begun to be published especially in medicine long before Cowdry's works started.

Robert R. Bensley and C. J. Herrick. In 1913, he received his Ph.D. degree from the department of anatomy and moved to the Johns Hopkins University as an associate in anatomy. His dissertation, *The Relations of Mitochondria and Other Cytoplasmic Constituents in Spinal Ganglion Cells of the Pigeon*, reveals his expertise in the precise description of microscopic objects with advanced staining techniques. He argued that the "neurosome," which the German cytologist Hans Held had seen in the cell, was not an independent entity but a mixture of two kinds of organelles, the mitochondrion and an organelle of unknown identity. He also claimed that there were four kinds of "morphologically independent" organelles within the cell – "the mitochondria, the Nissl bodies, the canalicular system and the neurofibrils."[16]

At Chicago, Cowdry learned the ideal of cooperation in biological research and gained expertise in cytology and microscopic anatomy. As historian of science Jane Maienschein has pointed out, the biology departments built by Charles O. Whitman during the late nineteenth century at the University of Chicago were the places where the "Chicago style" of biology developed.[17] It emphasized cooperative and comparative studies of heredity, development, and evolution of diverse organisms and their interactions. The Marine Biological Laboratory (MBL) at Woods Hole, Massachusetts was another place where professors and graduate students from Chicago gathered and interacted with biologists from other institutions. Philip Pauly has shown that the professional identity of the American biologists and the directions of their study were formed through their academic and leisure activities at the MBL.[18] Cowdry as a Chicago biologist was a member of this professional community and interacted with a number of eminent American biologists, including Conklin, Jennings, Raymond Pearl, and E. B. Wilson.[19] Many of them would offer him substantial assistance and cooperation when he edited his textbooks and organized the first conference on aging at Woods Hole.

At Chicago and Woods Hole, Cowdry was also influenced by contemporary American biologists' broad vision on the relation of biological science to human society. According to historian Sharon Kingsland, two biology professors at the University of Chicago, Charles Manning Child and Charles Judson Herrick, promoted the outlook of democracy and

[16] Cowdry, 1912, p. 25.

[17] Maienschein, 1988, pp. 151–184.

[18] Pauly, 2000, pp. 152–160.

[19] See Garrey and Cowdry, 1925; Cowdry to Pearl, 21 July 1926, Box 158, Folder 12, EVC.

progress through the ideas stemmed from their biological investigation.[20] Child and Herrick argued that living organisms' dynamic, holistic, and cooperative mode of survival and evolution in nature could teach humans a way of reorganizing their societies in an age of war, economic depression, communism, and fascism. Kingsland has also pointed out that the socio-biological ideas of these two scientists were shared by, and influenced by, many other scholars at that time – including philosopher John Dewey, physiologist Walter B. Cannon, protozoologist Herbert Spencer Jennings, and entomologist William Morton Wheeler – who also tried to show how knowledge gained from biological science could lead to better philosophy and more productive scientific research as well as humans' enhanced understanding of their society.[21]

Cowdry knew the above scholars' writings well and tried to keep in touch with them. Herrick was one of Cowdry's thesis advisors, and Child a faculty member at Chicago, with whom Cowdry maintained his relationship even after he finished his degree. In particular, Cowdry was familiar with Child's biosocial philosophy and cited it in his later writing.[22] During and after his doctoral training, Cowdry also met other scholars who interacted with his Chicago professors, such as Dewey, Cannon, and Wheeler. Cowdry first met Dewey while teaching anatomy at Peking Union Medical College in Beijing, China from 1917 to 1921,[23] and later asked him to write the chapter on education in *Human Biology and Racial Welfare* (1930) and the introduction to *Problems of Ageing*. Cowdry also kept in touch with Cannon on the matters of research and administration and asked him to compose the chapter on homeostatic mechanisms in *Problems of Ageing*.[24] Likewise, Jennings regularly met Cowdry at the MBL and assisted him by writing about the senescence of protozoa in *Problems of Ageing*. It is also important to note that Cowdry read and cited the writings of Wheeler, and requested him to author a chapter on the "Societal Evolution" in *Human Biology*.[25] As I

[20] Kingsland, 1991, pp. 195–230. Also see the primary sources cited in Kingsland's article. See Child, 1924, esp. pp. 267–300; Herrick, 1924, esp. pp. 295–309.

[21] Kingsland, 1991, pp. 196, 213–220. Also see, for example, Dewey, 1917, pp. 3–69; Jennings, 1927; Wheeler, 1928; Cannon, 1932, pp. 287–306.

[22] Cowdry, "Citizen Cells: How Cells Manage Their Social Problems," pp. 4(3)–5(4), Box 142, Folder 1, EVC. The number within the parentheses is an alternative pagination on each page, showing that Cowdry revised the manuscript many times.

[23] Cowdry to Dewey, 15 March 1920, Dewey to Cowdry, 9 March 1923, Box 6, Folder 40, EVC.

[24] Cowdry to Cannon, 18 June 1921, Cannon to Cowdry, 21 June 1921, Box 4, Folder 7, EVC.

[25] Cowdry, "Citizen Cells," pp. 5(4)–6(5).

will show in the next section, Cowdry's interaction with these scholars broadened his perspective on the potential role of biology in social betterment and welfare.

While carefully maintaining his relationship with these eminent people, Cowdry kept investigating various problems in biology and medicine using his expertise in detailed description of microscopic objects. In particular, he came to study microbes as well as eukaryotic cells after he returned from China and was appointed an associate member of the Rockefeller Institute.[26] For example, he studied the distinct staining properties of mitochondria and various types of bacteria as well as the difference between rickettsia and intracellular organelles.[27] He also investigated, through careful staining and observation, where in the nervous system of animals was affected by botulinus poisoning.[28]

But Cowdry was not completely satisfied with cytology's traditional mode of research which was employed in investigating the above problems. To him, the issues he studied were barely related to one another, except that most of them were about the cell and its various features. Unlike more experimental fields like physiology, Cowdry thought, there was no single unified view or paradigm in these cytological studies which, therefore, hardly led to any rigorous conclusions on the nature of living organisms.[29] Indeed, later scholars continued to view cytology in this way. For them, cytology was a kind of *morphology*, which aimed at precise description of various structural features of living organisms rather than understanding and theorizing essential biological phenomena such as heredity, development, and evolution. This made the accumulation of observational facts, which engendered endless controversy and confusion on the nature of the cell, the major activity of cytologists.[30]

However, cytology of the 1920s had ties to other more experimental fields because its subject, the cell, was the basic structural element of most biological phenomena. Geneticists such as Thomas Hunt Morgan needed cytological expertise to describe the behavior of the chromosome which they regarded as the material basis of heredity. Embryologist Edwin Conklin also had to be familiar with cytology to appreciate cell

[26] See Cowdry to Bensley, 22 October 1923, Box 3, Folder 6, EVC.

[27] Cowdry and Olitsky, 1922; Cowdry, 1923a, b.

[28] Cowdry and Nicholson, 1924.

[29] See, for example, Cowdry, 1923c, pp. 80–86. Cowdry thought that histology was not different from cytology in this respect, especially from physiology. See Cowdry, 1936, p. 292.

[30] See, for example, Bechtel, 2006, pp. 88–89.

growth and differentiation occurring in embryogenesis. Indeed, Cowdry himself was an advocate of introducing biochemical approaches in cytology and always considered experiments a way to make breakthroughs in biomedicine.[31]

This character of cytology – apparent lack of a paradigm and its linkage with more experimental subfields in biology – was reflected in *General Cytology*, edited by Cowdry. As Maienschein has mentioned, this book shows that cytology apprehended by him was a collective work contributed by various specialists on many different aspects of the cell, who seldom had "a single unified view."[32] Each specialist was wholly responsible for his or her chapter and was hardly guided by any central paradigm.[33] At the same time, experimental biologists participated in the book by writing about various problems related to cytology, such as the cell's reactivity, differentiation, heredity, and chemical constitution. Morgan wrote a chapter on "Mendelian inheritance in relation to cytology" and Conklin contributed to the part on cell differentiation during embryogenesis. Warren and Margaret Lewis also discussed the "behavior of cells in tissue culture," while Albert P. Matthews wrote about cell biochemistry.

As a biologist trained at Chicago and Woods Hole, Cowdry's goal was to edit *General Cytology* with these scholars' cooperation. While they came from many different subfields in biology and medicine, the cell, Cowdry thought, was important for all of them as "the fundamental unit in health and disease."[34] Although each chapter was their "independent contribution," Cowdry wanted to achieve "a certain coherence resulting from friendly cooperation" in the making of the book.[35] He wrote to his Chicago advisor Bensley that during the summer of 1922 "a strong sentiment developed in favor of co-operation in the writing of a textbook of general cytology" among the regular attendees of the MBL.[36] Cowdry asked these contributors to submit their chapter's "brief and tentative outline of two or three pages" before they began to write.[37] These outlines would then be "grouped and a synopsis of the entire book" would be sent to all the contributors to help them complete their chapters in accordance with the general outline and

[31] See Cowdry, 1925, 1927.

[32] Maienschein, 1991, p. 24.

[33] Cowdry, 1924, p. v.

[34] Ibid.

[35] Cowdry to Conklin, 23 October 1922, Box 4, Folder 63, EVC.

[36] Cowdry to Bensley, 28 September 1922, Box 3, Folder 6, EVC.

[37] Cowdry to Conklin, 23 October 1922, Box 4, Folder 63, EVC.

aim of the book.[38] Admittedly, this editorial work alone did not make *General Cytology* a coherent book organized around one general theme or argument. Each chapter was related to some, but not all, other portions of the book.[39] Yet Cowdry emphasized that "several of the contributors had developed their lines of study by availing themselves year after year of the facilities for investigation offered at Woods Hole," and in this sense, *General Cytology* could be regarded "as a contribution from the Marine Biological Laboratory" where cooperative research was an accepted norm.[40]

This character of Cowdry's cytology textbook continued in *Special Cytology*, another study of the cell edited by Cowdry. This book, which aimed at an exhaustive study of almost all kinds of cells known to biologists till that time, was written by 35 contributors. Interestingly, many of them were not "cytologists" by training and institutional position.[41] For example, Alexis Carrel of the Rockefeller Institute was a surgeon and expert of tissue culture. Alfred Cohn from the same institute was a cardiologist and Leo Loeb of Washington University was a professor of pathology and transplantation biologist. But these scientists contributed to cytology by discussing a specific type of cells they knew well, such as erythrocytes, lymphocytes, muscle cells, and nerve cells. To Cowdry, this was the way to relieve the book from "amateurishness" and to enhance "accuracy," although "unity and coherence" was sacrificed in some measure.[42] Nevertheless, he tried to make the book as coherent as possible through the same method he used to edit *General Cytology* – asking each contributor to submit a short summary of the chapter and sending it to other authors. "Although each writer is solely responsible for his own work," Cowdry wrote, "this helps to reveal gaps, to avoid duplication, to weld the presentations together, and to foster the cooperative aspect of the enterprise."[43]

Cowdry's editorial style which aimed at enhancing the collaborative character of the book continued in *Human Biology and Racial Welfare*, a multiauthored semi-popular book on various aspects of the human's biological constitution and social environments. To edit this book, he

[38] Ibid.

[39] For example, Cowdry and Morgan did not cite each other while Wilson was cited by both. Conklin cited Cowdry, Morgan, and Wilson, but not the Lewis or Mathews. Mathews cited none of the contributors to the book.

[40] Cowdry, 1924, p. v. Also see Maienschein, 1991, pp. 46–49.

[41] Cowdry, 1928, p. vii.

[42] Cowdry, "Suggestions for Contributors" circ. 1926, p. 1, Box 5, Folder 22, EVC, 1928, p. viii.

[43] Cowdry, "Suggestions for Contributors" circ. 1926, p. 2, Box 5, Folder 22, EVC.

actively interacted with a number of distinguished scholars from various fields, including the two leading scientists in the editorial committee – Conklin of Princeton University and William Gregory of the American Museum of Natural History – and the 25 prestigious contributors – including Cannon, Carrel, Dewey, and geneticist and eugenicist Charles Davenport. Robert Millikan, who was awarded the Nobel Prize in Physics in 1923, also kept contact with Cowdry to complete his chapter on "the relation of science to industry."

Although the two words in the title, "Racial Welfare," might mislead some readers into thinking that *Human Biology* was about racism or racist propaganda, the broad scope, contents, and perspectives, reflecting the diversity of the fields the above contributors represented, made it hardly possible to regard the book as a racist text.[44] This resulted from Cowdry's way of editing textbooks – asking the best scholars in each field to write their chapters according to their expertise. The choice of the contributors and topics also represented his wide view on the role of biological sciences in the progress and welfare of the *human race* that he learned at Chicago and Woods Hole. Admittedly, Davenport's chapter did deal with the social and racial problems from a rather conservative standpoint that can be shown in his warning against the "mingling of races."[45] However, anthropologist Aleš Hrdlička pointed out in another chapter that interbreeding between different racial groups had scarcely produced biologically undesirable consequences. Moreover, most human racial groups that had been deemed "pure" – such as Germans and Norwegians – were actually products of complex racial mixtures.[46] Conklin, while generally supporting the necessity of eugenics, also criticized extreme eugenicists who regarded a whole racial group such as blacks and Asians as a biologically inferior stock.[47] Instead, he called for a more sophisticated approach to eugenic problems through a thorough understanding of human heredity, development, and environment. The chapter written by Cowdry himself also aimed at an enhanced understanding of the relation of biology to human society and politics. Although his article contained a general review of basic cytological knowledge and its potential applications

[44] For example, Katz wrote that the book should contain "the full panoply of sexist, racist, anti-Semitic, and ethnocentric stereotypes of their time." See Katz, 1996, p. 97.

[45] Davenport, 1930.

[46] But Hrdlička thought that the white are generally more advanced and talented than the black due to their different evolutionary process in distinct environments. See Hrdlička, 1930.

[47] Conklin, 1930, pp. 578–579. See also Cooke, 2002.

rather than explicit political arguments, it made some remarks on the similarity between cells and individual humans in their societal organizations, which would later develop into his idea on the place of the elderly cells and people in their societies.[48] While holding such social implications in a remote sense, however, the chapters by Carrel, Cannon, J. F. Fulton, A. B. Macallum, and Hans Zinsser were summaries of their recent investigations in their discipline that contained little explicit mention of ''racial welfare'' or politics. Indeed, *Human Biology* was a book in which a broad spectrum of disciplines, approaches, and political standpoints were represented.

Human Biology was also a product of the consistent efforts of Cowdry to garner the cooperation of these contributors. At first, however, he was not sure of the scope, level, and the kinds of contributors and prospective readers of the book. But embryologist Edwin Conklin, one of his best friends at Woods Hole, was able to assist Cowdry's editorial job. Moreover, Conklin and Cowdry gained the support of another expert in human biology, William Gregory, by asking him to join the editorial committee when Gregory was elected as a member of the National Academy of Sciences through the help of Conklin.[49] These three scientists did their best to recruit contributors who were ''really eminent'' in their field.[50] Most were colleagues they had met at their professional societies, such as Davenport, Dewey, Carrel, Cannon, and Wheeler. The other contributors were invited through the recommendations of the people who already decided to join Cowdry's project. For example, the renowned criminologist William Healy at Yale University was recommended by Davenport[51] and J. F. Fulton of Oxford was asked by Cannon to co-author the chapter on neurophysiology with Charles Sherrington when Sherrington abruptly refused to participate in the project.[52]

Cowdry, Conklin, and Gregory closely cooperated in settling many other important editorial issues, and one of them was the level of scientific discussion in the book. While Conklin thought that it was not

[48] Cowdry, 1930, pp. 188–192.

[49] Conklin to Cowdry, 20 May 1927, Box 159, Folder 3, EVC.

[50] Cowdry to Conklin, 12 November 1926, Box 157, Folder 7, EVC.

[51] Davenport to Cowdry, 10 November 1926, Box 6, Folder 30, EVC.

[52] Cowdry to Sherrington, 15 October 1928, Cannon to Cowdry 14 December 1928, Box 178, Folder 10, EVC. Fulton actually wrote the chapter and Sherrington merely read and commented upon it, although both are listed as coauthors. Since Sherrington was an eminent neurophysiologist, his name was necessary to add prestige to the book. Also see Cannon to Cowdry, 6 December 1928, Cowdry to Fulton, 29 January 1929, Box 178, Folder 10, EVC.

appropriate to "popularize" their book too much by excluding more technical issues in human biology,[53] it was decided that the chapters should "explain in simple language just what is being done in lines of research directly affecting man."[54] Nevertheless, it was "unwise to overbalance on the side of simplicity and insult the reader by underestimating his capacity to comprehend things."[55] The editorial committee also had to determine whether they needed to assign a chapter on cancer or not, and whether they should include a discussion on the biochemical aspect of evolution. Eventually, the plan to include a chapter on cancer cells was cancelled because Cowdry's article partially included it, while the biochemical aspect of evolution was assigned a separate chapter since it had been neglected by biologists despite its importance.[56]

Another significant issue was the problem of Henry Osborn's chapter on "the antiquity of man," which could complement Gregory's article on "the animal ancestry of man." Although it was Gregory who recommended that Osborn join the project,[57] he himself found that Osborn's manuscript was "a hopelessly confusing and misleading production" with numerous "unverifiable assumptions."[58] On this problem, Conklin commented that the editors should "be prepared to decline articles that are not up to standard."[59] Yet it could be very embarrassing for the editors to write that they should turn down Osborn's chapter for such a reason, because he was Gregory's mentor and a respected senior scholar. Therefore, after discussing this issue with other editors, Cowdry sent a letter to Osborn to ask what should be done about his manuscript, since his "views … differ materially from those of our other contributors" and his chapter "consists almost wholly of clippings from [his] previous published articles."[60] The publisher wanted a completely new article rather than such "clippings" that might cause copyright problems. Osborn replied that the difference of views Cowdry mentioned could be quite interesting to some readers, and the copyright problems would not occur, because Osborn himself owned the copyright

[53] Conklin to Cowdry, 21 October 1926, Conklin to Cowdry, 26 August 1926, Box 157, Folder 7, EVC.

[54] "Suggestions as to Writing," Box 178, Folder 6, EVC.

[55] Ibid.

[56] Cowdry to Conklin, 23 October 1926, Box 157, Folder 7, EVC.

[57] Gregory to Conklin, 29 July 1927, Box 5, Folder 18, EVC.

[58] Gregory to Cowdry, 28 April 1928, Box 178, Folder 7, EVC.

[59] Conklin to Cowdry, 3 May 1928, Box 178, Folder 6, EVC.

[60] Cowdry to Conklin, 2 May 1928, Conklin to Cowdry, 3 May 1928, Box 178, Folder 6, EVC; Cowdry to Osborn, 5 May 1928, Box 161, Folder 3, EVC.

of his previous publications and his chapter did not consist of "clippings" from his former works.[61] Nevertheless, Osborn withdrew his chapter, since he already knew that his text "in its present form … embarrasses [the editors]" and he did not have enough time to rewrite it.[62]

Cowdry's interaction with the contributors also shows his collaborative way of working. As a scientist who developed a broad view on society and biology through his contact with his professional colleagues, he tried to discuss each chapter's topic with the author even if it was not directly related to his expertise. For example, he asked William Healy whether he could deal with the following questions in his chapter on criminology.

> 1. How would you define antisocial behavior, delinquency, and crime? In what do they differ? 2. To what primary factors may they be due? Is it a case of social maladjustment? Is an hereditary factor involved? 3. To what extent are they remediable? 4. In what countries is the situation most effectively met, and how? 5. What is … the proportion of state budget involved? Is this on the increase and, if so, how rapidly?[63]

He asked similar questions of other contributors, who usually responded with constructive feedback.[64] Moreover, as he had done before, he sent them the general outline of the entire book which was produced from each chapter's abstract.[65] This time, however, he used two new methods to become more actively engaged with the authors and enhance the degree of cooperation in the book production. First, he encouraged the contributors to read a few particular chapter synopses or full articles written by other authors that were closely related to theirs. For example, he asked Healy to read Wheeler's and Dewey's chapter synopses and recommended Cannon's article to Haven Emerson who wrote about "the Influence of Urban and Rural Environment" with Earle Phelps.[66] Second, he tried to hold "informal conferences" of the contributors and

[61] Osborn to Cowdry, 10 May 1928, Box 161, Folder 3, EVC.

[62] Ibid.

[63] Cowdry to Healy, 30 January 1928, Box 178, Folder 8, EVC.

[64] Cowdry to Ellsworth Huntington, 30 January 1928, Cowdry to Hrdlička, 30 January 1928, Box 178, Folder 8; Cowdry to Milikan, 31 March 1928, H. A. Overstreet to Cowdry, 12 October 1928, Box 178, Folder 9, EVC.

[65] Cowdry to Wheeler, 25 November 1927, Box 162, Folder 1, EVC; Cowdry to Wheeler, 12 January, 1928, Box 162, Folder 2, EVC.

[66] Cowdry to Healy, 30 January 1928, Box 178, Folder 8, EVC; Cowdry to Emerson, 18 May 1928, Box 178, Folder 7, EVC.

editors to discuss the contents and direction of the book.[67] Although it is not certain whether Cowdry really held that conference at the time, this attempt shows how his efforts to encourage cooperation among the authors could be translated into an actual scientific meeting. This translation would become important when he organized the first conference on aging while editing *Problems of Ageing*.

Cowdry participated in another cooperative handbook project, *Sex and Internal Secretions* (1932) which has been regarded as "the American Bible of Reproductive Endocrinology."[68] Although he did not directly edit the book, Edgar Allen, the editor and dean of the medical school of the University of Missouri, wrote that "this project saw its inception in a proposal by Dr. E. V. Cowdry, then Chairman of the Medical Division of the National Research Council," who helped "not only during the initial phases of this project, but throughout its progress and consummation."[69] Cowdry, in fact, gave Allen many helpful suggestions for a better book editing which required "much diplomacy, hard work and continual attention."[70] Even the organization of *Sex and Internal Secretions* was the same as the books Cowdry had edited. It was contributed by various experts from many disciplines such as embryology, gynecology, obstetrics, anatomy, biochemistry, psychology, and dairy husbandry. In this sense, these experts aimed at "a coöperative survey of recent advances in research on internal secretion in relation to sex."[71] As sociologist Adele Clarke has written, this survey represented the nature of American reproductive science which was made through the contributions of various fields in their institutional and social worlds that had the "mutual disciplining, reciprocal relations, and negotiations."[72]

Gerontology resembled the American reproductive science in that both consisted of various fields which interacted with one another and were represented in multiauthored handbooks. While *Sex and Internal Secretions* was the first such book for reproductive science, Cowdry's *Problems of Ageing* was the one for the science of aging. It is important to note that the first conference on aging at Woods Hole in 1937, which developed into the Club for Research on Ageing and the Gerontological Society, was originally planned as a discussion forum for the multidisciplinary

[67] Cowdry to Paul A. Lewis, 24 August 1927, Box 178, Folder 8, EVC.

[68] Clarke, 1998, p. 136.

[69] Allen, 1932, p. xx.

[70] Cowdry to Allen, 12 December 1932, Box 24, Folder 4, EVC.

[71] Yerkes, 1932, p. xvii.

[72] Clarke, 1998, p. 31.

contributors to *Problems of Ageing*. While he might not have been able to have an "informal conference" while editing *Human Biology*, he would hold a more formal conference in 1937 when he worked for his handbook on aging. The only difference between this book and the previous ones was that it was proposed and edited in a new social and economic condition during the Great Depression. The next section will discuss how Cowdry conceived and edited his new handbook in this difficult social environment.

Problems of Aging During the Great Depression: The Body Politic, the Body Anatomic, and Aging as a Scientific Problem, 1930–1936

When Cowdry published *Human Biology* in 1930, the severe economic recession after the stock market crash on October 24, 1929 already cast a gloomy shadow on every aspect of American's life. The long lines of hungry job seekers in one place and huge heaps of abandoned agricultural products in other places led scholars to rethink about the nature of capitalist economy and the social structure. What went wrong? What should be done to restore the disrupted economy and reorganize the society in a way that could be more stable in the future?

The establishment of the Social Security Act in 1935 was the federal government's response to the problem of old age during the Great Depression, although historians have not agreed upon what factor or issue at that time led to the making of the Act. Achenbaum has argued that it was the elderly people's poverty and unemployment during the Depression that motivated the policy makers to institute the Act.[73] While the aged Americans were already becoming marginalized in the industrializing American society of the early twentieth century, the disaster of the 1930s cut their work opportunities and means of support more sharply than any other age groups and thus threatened their survival in the severest way. These acute economic woes became a basis for establishing the national pension plan for helping the livelihood of the aged. However, William Graebner has argued that the New Dealers in the 1930s were not very concerned about the welfare of older Americans. The Act, which considerably increased the number of workplaces implementing the mandatory retirement over 65, was constructed merely as a means of reorganizing labor force in a more "efficient" way.[74] The logic was that more jobs could be available for

[73] Achenbaum, 1978, pp. 127–141, 1986, pp. 13–37.

[74] Graebner, 1980, pp. 181–214.

the younger and perhaps more efficient workers when the aged were forced out of the labor market. But Carole Haber and Brian Gratton claimed that the policy makers of 1935 did have concern for the elderly's welfare. Yet it was not old people's destitution but their elevated expectation for a more comfortable life that prompted the New Dealers to establish the Act.[75] According to Haber and Gratton, the developing industry during the early twentieth century brought more money and security to the elderly people's life through increased wages, family savings, and private pensions. Since the Depression destroyed these sources of stability in old age, people demanded an alternative one through the federal government, which was realized as the Social Security Act.[76]

In this article, I do not attempt to decide whose view is closer to the historical truth. What is more important for my study is the *discourse* on the state of the elderly which certainly problematized old age as one of the most important social and political concerns for the bureaucrats in the federal government. Despite differences in interpretation, historians have generally agreed that the bureaucrats felt an acute need to do something for elderly people, because old age was becoming a miserable part of life due to the insecurity incurred by the loss of jobs and pensions during the Depression. On the other hand, the bureaucrats thought, aged Americans were inefficient and conservative and perhaps a hindrance to the social and economic reorganization needed by the New Dealers. Although depicting quite a different picture on the economic reality of the elderly, Haber and Gratton have also agreed on this negative perception of old age, which was represented by the state of aged poor institutionalized in almhouses.[77]

It was at this time that Cowdry also began his handbook projects on the problems related to aging. During the early 1930s, he edited *Arteriosclerosis: A Survey of the Problem* (1933) which dealt with one of the most prevalent diseases in old age. This project began when the Josiah Macy, Jr. Foundation approached him for his professional advice on arteriosclerosis after he was appointed a professor of cytology at Washington University and chairman of the Division of Medical Research within the National Research Council.[78] On this request, Cowdry investigated who the most renowned experts on this disease were and who among them could contribute to the publication of a thorough

[75] Haber and Gratton, 1994, pp. 172–185.

[76] Sociologist John Macnicol has criticized this assertion. See Macnicol, 2006, p. 211.

[77] Haber and Gratton, 1994, pp. 178–179.

[78] Cowdry, 1933a, p. ix.

summary on the contemporary medical and biological understanding of the disease. The result of this effort was a book which was quite similar to his previous publications – a handbook written through the cooperation of multiple expert authors recruited from various fields, including histology, neurology, cardiology, cytology, and anatomy.

Cowdry's chapter on "the Structure and Physiology of Blood Vessels" in this book reflected the novel view of several contemporary scientists – such as Pearl, Charles Minot, Alfred Cohn, and, in some sense, Alexis Carrel – who focused on different features of aging at distinct localities in the body.[79] While aging had been thought to be caused by the gradual "diminution" or "decay" of some "vital principle" or "innate heat" that controlled the aging of the whole body, these twentieth century scientists began to give attention to each body part's different mode and rate of senescence rather than the overall feature or cause of aging.[80] In particular, Cowdry was heavily influenced by the tissue culture experiments of Carrel, his former colleague at the Rockefeller Institute. Cowdry mentioned the importance of tissue culture as early as 1920 and kept corresponding with Carrel over various issues.[81] Cowdry learned from Carrel that each type of cell needed distinct media to be cultured which also influenced the rate of cell senescence. From this, Cowdry inferred that the rate of cellular aging was determined by their location within the body that had a distinct local fluid environment.[82] He made this point clear in his chapter in *Arteriosclerosis*, which reviewed the morphology and physiology of blood vessels from arteries to veins. He argued,

> Since their local environments vary as well as their duties, the muscular arteries themselves exhibit peculiar and interesting modifications. The uterine artery is almost made anew with each pregnancy. The umbilical artery is a highly special structure designed to serve a temporary and unique function. The arteries of the placenta become old and senile in less than 9 months.[83]

[79] Minot, 1908, pp. 214–216; Cohn and Murray, 1927, pp. 482, 490; Pearl, 1922, pp. 138–149, 225; Carrel, 1924, 1931. Also see McCay, 1939, p. 574; Shock, 1952; Carlson to Cowdry, 28 June 1937, Box 10, Folder 397, WDM.

[80] See, for example, Grant, 1979.

[81] Cowdry, 1920, p. 94. See, for example, Cowdry to Carrel, 13 April 1929, Box 159, Folder 5, EVC.

[82] Cowdry, 1939, pp. 643, 685, 689.

[83] Cowdry, 1933b, p. 63.

The rate of growth and senescence of each blood vessel differed depending on its local environment. Although the individual organism itself might be far from being senile, the cells constituting its blood vessels at a particular environment tended to undergo senescence at their own rate.

Indeed, Cowdry had been interested in cellular senescence as early as in 1916. In a review article, he pointed out that the number of mitochondria progressively decreased as the cell containing them aged. He wrote that "the most striking example of this" could be observed "in sections of the skin as one passes from the cells of the deeper layers, which contain many mitochondria, to the more superficial, desquamating cells, which are dead or dying and … quite devoid of mitochondria."[84] This phenomenon could also be seen in the alterations of red blood cells which gradually lost their mitochondria as they changed from nucleated to anucleated cells with "aging." What was important to Cowdry in these processes was that skin cells and red cells aged and died even while the whole body was still young. His focus was cell aging at a particular location within the body rather than the whole individual organism's senescence.

This idea reappeared in *Human Biology*. In his chapter of this book, he repeated his 1916 statement on the aging of the skin cell, which showed an interesting irony: "While we are in life we are in death."[85] That is, senescence occurred constantly in every portion of our body even when we were youthful individuals. And this process of aging was more closely related to each cell's local environment than its genetic constitution, which was uniform throughout the body.

Cowdry was thinking about this issue and its meaning for the social place of the elderly when he asked Ludwig Kast, president of the Macy Foundation, to support his new handbook on aging. On October 9, 1935, recollecting his arteriosclerosis project with the Foundation, Cowdry wrote to Kast that he had "an idea which may or may not appeal to" him.[86] Cowdry wrote,

> The problem of ageing in relation to arteriosclerosis often confronted us. Would it not be a good plan to make a similar study of this problem of ageing viewed from many angles? I think that the factors involved in "growing old" have been sadly neglected. Interest has centered in helping the young. Old age is inevitable and so, as with arteriosclerosis, nothing is done to postpone it or to

[84] Cowdry, 1916, p. 432.

[85] Cowdry, 1930, p. 189. This statement probably came from *The Book of Common Prayer*. See The Church of England, 1559.

[86] Cowdry to Ludwig Kast, 9 October 1935, Box 31, Folder 9, EVC.

> render it less tragic. This is not a small matter; it is a serious [indictment] of our body politic.[87]

In fact, since the publication of *Human Biology* in 1930, Cowdry had been pondering the similarity between this "body politic" – the society of human beings – and the "body anatomic" – the society of cells within a living organism – and the way to improve the body politic through the knowledge gained from the study of the body anatomic. Like humans in the body politic, cells in the body anatomic lived in communities and went through a series of life stages, such as birth, growth, maturity, and senescence.[88] The cell community also had its "criminals," such as cancer cells, just as the human society did.[89] Through his cytological research, however, he came to think that the cell community was much better than the human community in solving social problems in an effective way. Most of all, the aged and dead cells in their specific localities still played an important role in the maintenance of the whole body whereas the elderly people in their societies were suffering from the loss of their place during the Depression. For example, the senile and dying cells in the epidermis maintained their status as a significant member of their local community through their role as a "shield between the living delicate tissues beneath and the environment outside" like a "shock absorber."[90] In contrast, as Cowdry wrote to Kast, aged Americans during the 1930s were "wrongly [considered] to be past their usefulness."[91]

In his two manuscripts written at that time – "the Biological Basis of the New Deal" and "Citizen Cells: How Cells Manage Their Social Problems" – Cowdry developed this idea further. Although he was not successful in publishing these writings,[92] they reflected his view on living organisms and human societies, which had matured through his contact with his colleagues at Chicago and Woods Hole and his own reflection on the cause of the Depression.

In the first chapter of "Citizen Cells," he cited the ideas of several biologists with whom he had interacted since the 1910s – Conkin, Child,

[87] Ibid.

[88] Cowdry, 1930, pp. 188–189.

[89] Ibid., p. 192.

[90] Ibid., p. 189.

[91] Cowdry to Kast, 9 October 1935, Box 31, Folder 9, EVC.

[92] Although Cowdry submitted his manuscripts to the Williams and Wilkins Company, the editor thought that it was very "formidable" and "not an easy subject for the [general] reader to sustain his interest in." See Robert S. Gill to Cowdry, 19 April 1939, Box 42, Folder 22, EVC.

Wilson, Wheeler, and Pearl. For example, Cowdry noted Conklin's argument that "the animal body has always been regarded as the ideal for the organization of society" along with Wilson's claim that "the multicellular organism may be regarded as a 'cell-state.'"[93] For Cowdry, these twentieth-century scientists reconfirmed the validity of the old analogy between the human body and society through their biological research. Yet Cowdry knew that many social scientists did not accept such analogies which, they thought, were "no proof of anything" and even potentially "vicious because they are unscientific and likely to lead the unwary astray."[94] Moreover, according to a renowned sociologist R. M. McIver, "the territory which the sociologist explores changes even as he explores it," while "human nature was not very different thousands of years ago."[95] However, Cowdry claimed that "a human being … is always changing so that the material of a cytologist is … much closer to that of a sociologist than is that of a physicist or a chemist."[96] As he would show in the rest of his manuscript, there were indeed numerous examples of how a living organism dynamically changed its state according to environments, just as human societies did. Therefore, it was still useful to find the similarities between the human body and society, and this was a way to "join a distinguished company of biologists" he cited in the manuscript.[97]

Cowdry found a number of such similarities, many of which were drawn from the contemporary issues concerning the Depression. Yet the body anatomic was much better in solving their problems than the body politic. He pointed out that the body anatomic had in the cardiovascular system a much better way of distributing energy resources than the body politic which was then suffering from "the burning of grain in Kansas, urgently demanded in industrial areas … and the letting of coal heap up at the mine heads, while people suffer from the cold in other parts of the country."[98] Another example was the problem of unemployment which was "unknown" in the body anatomic with its effective use of the labor force that had developed during its long evolutionary process.[99] He wrote, "[n]ever in the body anatomic is the risk incurred of disrupting established conditions by the sudden introduction of some

[93] Cowdry, "Citizen Cells," pp. 1(2), 2(3).
[94] Ibid., pp. 7(8), 8(9).
[95] Ibid., p. 11(13).
[96] Ibid., p. 11(13).
[97] Ibid., p. 25(54).
[98] Ibid., p. 105(8).
[99] Ibid., pp. 55, 74(74).

new invention permitting one to do the work of many'' as was the case in the body politic.[100] For instance, Cowdry pointed out that industrialists and scientists, such as Charles Kettering of General Motors Corporation, had argued that the advancement of science and technology could create more jobs than those eliminated by the introduction of new machines.[101] Yet Cowdry knew that many of his contemporaries thought differently. In the case of automobiles industry, the rise of mass production technology eliminated the jobs related to the traditional means of transportation – such as manufacturers of harnesses, carriages, wagons, and those who drove and took care of horses – even though big corporations like GM created some positions in their factories.[102] Cowdry wrote that the federal government already took action upon this problem by initiating the New Deal and establishing the National Resources Committee. Rather than letting the problem be dealt with solely by scientists and industrialists, Americans realized the importance of managing the resources of their society in a more systematic way to avoid the same economic problems. As Cannon wrote in *The Wisdom of the Body*, however, the body anatomic did not have such a problem and its way of using labor forces might teach humans ''the biological basis of the New Deal.''[103]

Yet the body anatomic was not always the best model for reorganizing the human society. In cell communities, ''government is largely automatic'' and ''many citizen cells are without direct representation.''[104] Moreover, ''laws, or codes of behavior, are to maintain order not to provide equal treatment for all.''[105] Indeed, ''class distinctions are definite because division of labor must be maintained'' very strictly for the health of the whole body.[106] In this sense, the body anatomic was similar to the ''totalitarian [states]'' which were rapidly rising in Europe during the 1930s.[107]

But the body anatomic was different from the actual totalitarian states. Cowdry wrote that ''there are … two fundamental differences

[100] Ibid., p. 54(79).

[101] Ibid., p. 55(80).

[102] This shows that Cowdry also felt what historian Daniel Kevles has called a ''revolt against science'' during the Great Depression. See Kevles, 1995, pp. 236–251. Also see Dupree, 1986, pp. 344–368; Bix, 2000.

[103] Cowdry, ''The Biological Basis of the New Deal,'' pp. 1, 4, Box 172, Folder 8, EVC. See Cannon, 1932, pp. 287–306.

[104] Cowdry, ''The Biological Basis of the New Deal,'' p. 6.

[105] Ibid.

[106] Ibid.

[107] Ibid., p. 8; Cowdry, ''Citizen Cells,'' p. 157(157).

between the community of cells and the totalitarian state as ordinarily conceived.''[108] First, the nerve cells in the body anatomic, despite their ruling power, were not dictators like those in real totalitarian states, because their ability to rule the whole body had evolved for millions of years during which they became able to respond to the suggestions and recommendations of other citizen cells. Second, the body anatomic was regulated according to its ''constitution,'' ''which do not change … at the behest of politicians,'' unlike Nazi Germany and Fascist Italy.[109] Moreover, cells retained their ability to live independently if they were detached from the body anatomic, as Carrel's tissue culture experiments showed.[110] Indeed, many citizen cells were enjoying some sorts of independence even when they were living within the body anatomic, because, as Carrel's experiments and Cowdry's own observations indicated, most cells lived in their own distinct local fluid environment rather than in blood or lymph that was tightly regulated by homeostatic mechanisms.[111]

For these reasons, Cowdry thought that the body anatomic could be a good guide for solving various problems in the human society during the Depression, including those of old age. According to him, ''virile people between 35 and 45 only enjoyed half the chance [of reemployment after losing jobs] as compared with individuals only a little younger. And what of the decades 45–55 and 55–65?''[112] The body anatomic, however, was very different from the human communities during the Depression. It did not have any ''age discrimination,'' since ''all cells begin to work in particular ways, gradually, when they become able to do so … Many cells function during reproductive maturity, others (polymorphonuclear leucocytes) after it, and still others (red blood cells) after they have died.[113]

For Cowdry, nature was a source of wisdom and guidance, even though not every feature of it was acceptable as a model. He thought that the body anatomic could offer ways to solve the body politic's

[108] Cowdry, ''Citizen Cells,'' p. 158(158).

[109] Ibid., p. 90(127), 158(158).

[110] Ibid., p. 20(49).

[111] Ibid., pp. 107(2)–108(3). In this respect, Cowdry's idea was based on the possibility of ''in vitro life'' realized by Carrel's works, which made a departure from Claude Bernard's *milieu intérieur* and the traditional notion of organic integrity. See Landecker, 2002.

[112] Cowdry, ''Citizen Cells,'' p. 56(83).

[113] Ibid., p. 55B(82).

problem of age discrimination which was indeed a deeply troubling social issue in America, particularly during the 1930s.[114] He continued,

> Many aged and dead cells are not consigned to oblivion. They still serve the rest and are given positions of great importance. Firmly bounded together in a dense layer on the surface of the skin, dead epidermal cells act as a shield and protect the living cells within. ''While we are in life we are in death'' is a true saying … To summarize, as far as labor is concerned, the body anatomic is a community of cells in a kind of moving equilibrium as it passes through phases of youth, maturity and old age … the labor is spread fairly evenly among all of them so that there is no division into employed and unemployed. Far greater equality is provided among cells … than … in the body politic.[115]

Cowdry argued that the body politic's neglect of its elderly members could be easily accounted for. ''There is a taboo,'' he wrote, that the elderly ''are on the downward path and we don't like to think that we shall follow in their footsteps.''[116] Hence, people tended to ''pay them a small dole'' and ''shrug our shoulders, saying death is inevitable anyway and pass by on the other side.'' Indeed, ''we turn from them to beautiful, starry eyed children full of promise for the future.''[117]

This was the problem of aging Cowdry had in mind by the time he sent his letter to Ludwig Kast of the Macy Foundation. According to him, ''the passing generation, in its 'second childhood' … is expected to retire gracefully without complaint and with no assistance.''[118] But ''obviously this is all wrong,'' he argued. In this state, what was urgently demanded was ''another project logically following'' the arteriosclerosis project.[119] As he wrote in ''Citizen Cells,'' ''a systematic study of the problem of the aged'' was needed in order to ''profit from the many ways that aged persons can serve and then with proper safeguards to ease their departure.''[120] He stated that Kast would ''appreciate the magnitude of the task

[114] See Macnicol, 2006; Achenbaum, 1978, pp. 127–131; 1986, pp. 14–18; Hushbeck, 1989; Haber and Gratton, 1994, p. 114.

[115] Cowdry, ''Citizen Cells,'' pp. 58(86)–59(87).

[116] Ibid., p. 56(83).

[117] Ibid., p. 56A(84).

[118] Cowdry to Kast, 9 October 1935, Box 31, Folder 9, EVC.

[119] Ibid.

[120] Cowdry, ''Citizen Cells,'' p. 57(85).

and how fruitful a propitious beginning might be.''[121] Yet Kast did not immediately promise a support. Although Cowdry's letter was ''most interesting'' and ''has been constantly in [his] mind,'' there were also ''a few 'cons' which [he wanted] to think over.''[122] So Cowdry wrote again, this time with a list of queries on aging. This list included social, psychological, medical, and biological research topics, such as

> What arrangements are made for the care of the aged by (1) private organizations, religious and otherwise, and by (2) municipal, state and federal governments?… What are the shining examples of great service in government by the aged?… In what ways does the mind of an aged person react differently to the same situation from the minds of a mature and of a youthful person?… Does the body age as a unit, or may a youthful thyroid, a mature pituitary and a senile liver be forced to labor together for the preservation of the whole?… Why is cancer often less malignant in extreme old age?[123]

These queries for future research projects finally moved Kast. He replied, ''The problem as you conceive it in its major implications is of course a very timely and in many ways an urgent problem and an inquiry into this problem may lead to a very fine piece of work.''[124] With this approval, Cowdry began his new handbook project on the current state of research on senescence.

It was this project that initiated the Macy Foundation's long-term support of gerontology, which continued for more than 20 years after the 1930s.[125] Fortunately, Cowdry and the Foundation were ideal partners, since the Foundation valued communication and cooperation of the people involved in the projects, as Cowdry did in editing his textbooks.[126] The next section will describe how Cowdry, with the Foundation's assistance, constructed gerontology as a multidisciplinary scientific field after 1935.

[121] Cowdry to Kast, 9 October 1935, Box 31, Folder 9, EVC.

[122] Kast to Cowdry, 15 October 1935, Box 31, Folder 9, EVC. But Kast did not clarify what these ''cons'' were.

[123] Cowdry to Kast, 28 October 1935, Box 31, Folder 9, EVC.

[124] Kast to Cowdry, 31 October 1935, Box 31, Folder 9, EVC.

[125] Admittedly, the Foundation was supporting several small projects on arteriosclerosis. But these were not gerontology programs in a strict sense. See Achenbaum, 1995, p. 64. See The Josiah Macy, Jr. Foundation, 1950, p. 31.

[126] Fremont-Smith to Cowdry, 21 November 1947, Box 41, Folder 8, EVC.

Problems of Ageing, Woods Hole Conference, and the Making of Multidisciplinarity in Gerontology, 1935–1940

With support of the Macy Foundation, Cowdry edited *Problems of Ageing* (1939), a monumental book in the history of gerontology. For Katz, Cowdry's book was one of the first successful "textual formations" in gerontology, which brought together diverse schools, curricula, scientific expertise, and academic power relations in one place and "naturalized" their associations.[127] Achenbaum has also argued that the contributors to *Problems of Ageing* "helped to establish professional organizations and research institutes that remain in operation to this day."[128] As he has correctly pointed out, this remarkable book reflected Cowdry's "own professional style" that had been developing since he had edited *General Cytology*.[129] Indeed, Cowdry continued his editorial job in an advanced form to produce *Problems of Ageing*.

One of the most notable points of this continuity can be found in Cowdry's choice of contributors. Many of them were recruited from those who had already participated in his previous book projects – including Cannon (*Human Biology*), Cohn (*Arteriosclerosis*), Dewey (*Human Biology*), T. W. Todd (*Special Cytology*), Clark Wissler (*Human Biology*), and E. B. Krumbhaar (*Special Cytology*). Allen, who edited *Sex and Internal Secretions* with Cowdry's assistance, wrote the chapter on the aging of the female reproductive system. The other authors were specialists of particular problems in aging research and were usually recruited through the above scholars' recommendations. For example, Walter Miles, a psychologist who initiated the Stanford Studies of Later Maturity in 1928,[130] was recommended by Allen as a contributor.[131] William de B. MacNider of the University of North Carolina also joined the project as an expert on the senile changes of tissue susceptibility to chemicals. Cowdry also recruited Jennings, who investigated the aging of protozoa, and Clive M. McCay at Cornell University, who discovered in 1935 that reduced caloric intake increased rats' longevity.

The chapters written by these contributors were similar to those of Cowdry's previous books in terms of the subjects and ways of organization. As his *Special Cytology* dealt with the cells in the skin, blood, heart,

[127] Katz, 1996, pp. 77–103, esp. 97–103.

[128] Achenbaum, 1995, p. 53.

[129] Ibid., p. 63.

[130] This study has barely been mentioned by historians of science. See Birren, 1979, pp. 74–75.

[131] Cowdry to Allen, 22 January 1937, Box 24, Folder 4, EVC.

bone, ovary, testes, renal system, and nerve system, *Problems of Ageing* included the chapters on the aging of the skin, cardiovascular system and blood, skeleton, female and male reproductive system, urinary system, and brain. The mission of Cowdry's cytology project – precise description of various portions of the living organism through the cooperation of specialists on each part – was transferred to the study of senescence.

Cowdry also actively interacted with the contributors as he had done to edit the previous books, although his intention of doing so was not always well understood by the contributors. For example, after receiving A. J. Carlson's chapter on the aging of endocrine system, Cowdry asked whether Carlson thought that the recently observed "fall in serum Ca. from 11.6 mg. to 10.0 mg. in men … as age progresses" was within normal limits or not, and how he thought about the decreased response of tissues to hormones described by Allen.[132] Carlson replied that serum calcium level within that range was essentially normal and the decreased response toward hormones with aging was not yet fully appreciated. But he could not understand why Cowdry was interested in such details of his work. Indeed, Carlson was not familiar with Cowdry's editorial style since he had not contributed to any of Cowdry's previous projects. So Carlson added after his answer to Cowdry's questions, "Brother, you are just too enthusiastic about my chapter."[133]

Collecting and distributing the summaries of all the chapters to encourage cooperation was another aspect of Cowdry's editorial work that continued since he had edited *General Cytology*. This time he often sent actual draft of the chapters as well as their summary, and through this, the contributors came to know the works of the scholars with different background and tried to help one another in writing their chapters. For example, physiologist Walter Cannon asked cardiologist Alfred Cohn whether the aged heart responded to stress "by dilating and beating more rapidly than normally, whereas the effective athletic heart responds by a greater degree of emptying and not so much by acceleration."[134] Cohn answered that his current research project was dealing with this question, and wrote that the more aged the heart was, the more the degree of increase of the pulse rate during exercise.[135] Psychologist Walter Miles also sent pharmacologist William MacNider an article on aging that he thought "might be of some service to [MacNider] in the preparation of

[132] Cowdry to Carlson, 19 July 1938, Box 25, Folder 23, EVC.
[133] Carlson to Cowdry, 20 July 1938, Box 25, Folder 23, EVC.
[134] Cannon to Cohn, 27 October 1937, Box 5, Folder 5, AEC.
[135] Cohn to Cannon, 29 October 1937, Box 5, Folder 5, AEC.

[his] chapter."[136] MacNider appreciated Miles for sending the article.[137] Likewise, MacNider asked botanist William Crocker about the "mitotic figures of an abnormal order" in plant cells, which could lead to modified cell types.[138] MacNider was interested in this phenomenon because he also observed in animals some altered types of cells, which persisted longer in older organisms and contributed to enhancing their overall defense capacity against toxic chemicals.[139] Crocker wrote to MacNider how he thought about this phenomenon and detailed his current and future research on the topic.[140]

Cowdry's efforts sometimes engendered a clash rather than cooperation among the contributors, and he did his best to lead the debate to a constructive direction. For example, MacNider was not very satisfied by Jean Oliver's writing on the aging of the urinary system. MacNider wrote, "It strikes me that the trouble that he is having is dependent upon his assumption that all tissue changes which depart from a hypothetical normal are essentially pathological."[141] Moreover, MacNider claimed, Oliver did not "realize the type of readers which [Cowdry] and the Macy people … are hoping to reach."[142] While the book was targeted to general educated readers as well as professionals, Oliver's chapter was too technical for the former to appreciate. Yet this did not mean that his chapter would satisfy the latter, since Oliver failed to "incorporate … an adequate amount of experimental material, as indicated by the relatively few references he gives to the changes in the kidney."[143] Cowdry did not send this critical note of MacNider to Oliver, even though he usually transmitted other authors' comments to each contributor.[144] But MacNider himself personally sent Oliver a telegram, requesting the list of the reference he mentioned in his letter to Cowdry.[145] Although Oliver immediately sent MacNider a list of relevant publications, such an abrupt act of MacNider embarrassed Cowdry.[146] He gently wrote to

[136] Miles to MacNider, 8 December 1937, Box 11, Folder 417, WDM.

[137] MacNider to Miles, 29 June 1938, Box 11, Folder 441, WDM.

[138] MacNider to Crocker, 1 July 1937, Box 10, Folder 398, WDM.

[139] MacNider to Fremont-Smith, 14 June 1938, Box 11, Folder 440, WDM.

[140] MacNider to Crocker, 29 June 1938, Box 11, Folder 441, WDM.

[141] MacNider to Cowdry, 30 August 1937, Box 31, Folder 8, EVC.

[142] MacNider to Cowdry, 22 September 1937, Box 31, Folder 8, EVC.

[143] Ibid.

[144] Cowdry did transmit Cannon's more favorable comments to Oliver. Cowdry to Oliver, 28 September 1937, Box 33, Folder 4, EVC.

[145] See Oliver to Cowdry, 3 January 1938, Box 33, Folder 4, EVC.

[146] Oliver to MacNider, 3 January 1938, Box 11, Folder 421, WDM.

MacNider, "It is my impression that you are perhaps taking your task too seriously."[147] What was appropriate for each chapter was a general summary of the current state of the research rather than "a very long or detailed account of the subject."[148] On the same day, he wrote to Oliver that "it is unavoidable that there will be duplications and also omissions" and this was "the weakness in the kind of presentation we are making."[149] Cowdry's job was to minimize this weakness and "to promote cooperation between the authors."[150]

A more heated controversy occurred between Walter Cannon and Cowdry himself as a contributor. Although Cowdry wrote to Cannon that his chapter on the aging of tissue fluids was "built upon [Cannon's] very interesting account of the ageing of homeostatic mechanisms,"[151] Cannon suddenly criticized Cowdry's "fantastic hypothesis" that "if the environment of cells were uniform the division of labor among them would be quite impossible."[152] He argued that "this assumption seems to contradict all we know about the relations of structure and function," and asserted that "if cells are different in structure they will be different in function, even if the environment is the same."[153] Basically, Cowdry wrote that each cell matured and aged at a distinct rate because it was immersed in its peculiar local fluid environment. This argument had developed from his earlier cytological interest in cell aging and the influence of Carrel's research. However, Cannon, a physiologist, was interested in how an organism's aging led to the gradual disruption of its homeostatic mechanisms – such as those regulating the acid-base balance of blood plasma – which allegedly controlled *all* portions of the body via blood and lymph.[154] Yet if homeostatic mechanisms and their aging were deeply related to the regulation of the life and senescence of every cell in the body, how then could each cell develop and maintain its peculiar identity? Cannon stated that as different protozoa in a pond could keep their self-identity despite the same fluid environment, cells in multicellular organisms could also maintain their distinct character although they constantly contacted blood and lymph. But Cowdry pointed out that this statement of Cannon missed the point because

[147] Cowdry to MacNider, 5 January 1938, Box 11, Folder 421, WDM.
[148] Ibid.
[149] Cowdry to Oliver, 5 January 1938, Box 33, Folder 4, EVC.
[150] Ibid.
[151] Cowdry to Cannon, 6 May 1938, Box 25, Folder 22, EVC.
[152] Cannon to Cowdry, 6 June 1938, 24 June 1938, Box 94, Folder 1302, WBC.
[153] Cannon to Cowdry, 6 June 1938, 24 June 1938, Box 94, Folder 1302, WBC.
[154] Cannon, 1939.

each protozoan organism in a pond had a distinct genetic constitution while the cells in a metazoan animal had the same gene sets.[155] The metazoan cells nevertheless differentiated into distinct types, because they lived in their unique local fluid environment.

Cannon, however, was not persuaded. He wrote again that Cowdry did not yet provide "any convincing evidence that the environment is different for many different kinds of cells in many different parts of the body."[156] He also asserted that he failed "to see how [Cowdry] could expect the tissue fluid which escapes through the capillary wall to be very different in one region as compared with another, unless there is demonstrable difference in the structure of the cells in the capillary wall."[157] Moreover, Cannon asked, "Even in the 'same fluid blood serum environment,' … do not the various cells of tissue cultures 'maintain their distinctive structure'?"[158] Through his cytological knowledge, Cowdry defended his position from these questions. First, he cited recent cytology articles which indicated that cells in the spleen and connective tissues were surrounded by unique fluid environments which chemically differed from other portions of the body.[159] Second, he pointed out that capillaries were not the sole blood vessel through which fluids could escape bloodstream into local tissue environments. Other larger blood vessels also allowed the exchange of fluids between tissue and blood, and each of them had distinct permeability due to its peculiar structure. Third, he argued that his colleague Carrel had already shown that different types of cells needed different fluid media to be cultured since blood plasma was not an adequate medium for any kind of cells.[160] For Cowdry, Carrel's experiment was an *in vitro* proof of his idea that local fluid environment controlled cells' differentiation and aging. As an example, Cowdry wrote that red blood cells and lymphocytes matured and aged in their distinct local surroundings apart from blood plasma and were released into bloodstream only after they became very aged or nearly dead.[161] Red blood cells could do their work "when they are dead or nearly so," and the leucocytes, when they were

[155] Cowdry to Cannon, 27 June 1938, Box 25, Folder 22, EVC.

[156] Cannon to Cowdry, 6 July 1938, Box 25, Folder 22, EVC.

[157] Ibid.

[158] Cannon to Cowdry, 12 July 1938, Box 25, Folder 22, EVC.

[159] Cowdry to Cannon, 8 July 1938, Box 25, Folder 22, EVC. For the original sources of this evidence, see Bensley, 1934; Knisely, 1936.

[160] Cowdry to Cannon, 16 July 1938, Box 25, Folder 22, EVC.

[161] Ibid.

allowed to work, ''are so old that they have lost their ability to multiply.''[162] Receiving these answers, Cannon responded that he would reply to Cowdry after ''some further examination of data.''[163] But Frank Fremont-Smith of the Macy Foundation, who knew of this controversy, asked both of them to stop, since ''controversial material is out of place in this cooperative venture'' and ''the question is largely one of emphasis'' rather than something in need of a definite answer.[164] While it is not certain whether Cannon and Cowdry agreed with Fremont-Smith on this matter, the controversy was not continued thereafter.

In retrospect, debates of this kind are quite common in a scientific community and often indicate that it is in a healthy state. But the debates can also be damaging to the community, especially during its early phase when its institutional norms were not established. In this sense, Fremont-Smith's involvement could be thought to be an appropriate way to protect the fledgling community of researchers of aging from being disrupted due to a heated internal controversy.

One of the most important causes of this internal controversy between Cowdry and Cannon was multidisciplinarity of gerontology which included the two scientists who had different scientific background and distinct prescriptions on the problems of the ''body politic.'' As a cytologist, Cowdry was interested in the study of *local* objects while Cannon as a physiologist studied the changes in the *whole* body which homeostatic mechanisms regulated. Interestingly, this difference was related to what they thought about desirable societies. Based on physiological research, Cannon argued in *The Wisdom of the Body* that homeostatic mechanisms of the ''body physiologic'' could be a model of ensuring the stability of the ''body politic.''[165] While agreeing with this idea in many respects, Cowdry slightly differed on why the ''body anatomic'' – rather than the ''body physiologic'' – could be a good model for humans' social reorganization. Whereas Cannon thought that homeostatic mechanisms controlling the internal stability of the body could be referred to in maintaining an order in the human society, Cowdry thought that this aspect of the body, despite several strong points, was too similar to totalitarian states.[166] To Cowdry, what was more important in the body anatomic as a model of better body politic was the diversity of its *local* environments and the cooperation among cells living there. As a cytologist, he observed that most cells ''live

[162] Ibid.

[163] Cannon to Cowdry, 2 August 1938, Box 25, Folder 22, EVC.

[164] Fremont-Smith to Cannon, 21 July 1938, Box 94, Folder 1302, WBC.

[165] Cannon, 1932, pp. 298–306.

[166] Cowdry, ''Biological Basis of the New Deal,'' p. 8.

outside the [bloodstream] in what is called tissue fluid,'' which provided peculiar local environment to its residents.[167] The cells in such environments cooperatively contributed to the making of their own living conditions and the survival of the whole body while satisfying their own needs. In these aspects, particularly in terms of fulfilling the needs of their local residents, the body politic was far behind the body anatomic.[168]

The two scientists drew different conclusions on the problems of old age through these distinct analogical reasoning. Cannon, supporting the value of the ''sacrifice of lesser for greater values'' and ''lessening of the independence'' of the individual for larger social benefits,[169] thought that aged cells were hardly useful members of the body physiologic, because their death eventually contributed to the demise of the whole body. While the body politic usually didn't need to worry about death like the body physiologic, the aged individuals were still not useful members and their death was ''a means of ridding society of old members in order to yield places for the new.''[170] Cowdry, who valued local diversity, had a very different idea on this issue. For him, many kinds of aged cells, such as red cells and lymphocytes, were produced from the diversified local environments and served important functions for the whole body. Indeed, red cells and lymphocytes were already old at the time of release into bloodstream, and therefore, the former could live only for 40 days before death, and the latter less than 20 hours. Yet they carried out significant functions such as carrying oxygen and defending the body from parasites.[171] To Cowdry, what could be learned about the problems of aging from the body anatomic was this aspect which ensured and demanded the continuous use of its elderly members.

Such a view on aged people and cells, which was absent in Cannon's view on the relationship between the body politic and physiologic, was perhaps less influential than Cannon's because Cowdry did not publish it.[172] However, Cowdry's worries on the social place of elderly people that appeared in his unpublished writings led him to recruit to his project the scholars with similar concerns. In particular, Cowdry invited

[167] Cowdry, ''Citizen Cells,'' p. 107(2).

[168] Ibid., pp. 108(3)–110(5).

[169] Cannon, 1932, pp. 304–305.

[170] Ibid., p. 302.

[171] Cowdry to Cannon, 16 July 1938, Box 25, Folder 22, EVC. Also see Cowdry, ''Citizen Cells,'' p. 58(86).

[172] On the influence of Cannon's idea, see Cross and Albury, 1987. Cannon's view on elderly people and their social roles became more positive after publishing *The Wisdom*. See ''Meeting of the Club for Research on Ageing,'' p. 6, 11–12 January 1940, Box 41, Folder 2, EVC.

Dewey to write the introduction to *Problems of Ageing*. Dewey wrote that the elderly's employment became a social problem during "the recent economic crisis," since "persons above fifty are experiencing ever greater difficulty in finding employment."[173] Yet there was another dimension in contemporary problems concerning aging. According to him, "conservatism increases with age … at just the time when measures of social readjustment are most needed, there is an increasing number of those whose habits of mind and action incline them to resist policies of social readjustment."[174] For him, these problems were both biological and social in nature, because elderly people's change of biological capacity occurred in their social space. Therefore, the solution required knowledge about "the ways in which social contexts react back into biological processes as well as … the ways in which the biological processes condition social life. This is the problem to which attention is invited."[175] Cowdry wrote to Dewey that this remark pointed to an issue which was "of utmost importance."[176] Louis Dublin, a statistician and vice-president of the Metropolitan Life Insurance Company, was also invited to write a chapter, in which he showed how the increased longevity and declining birthrate made America "a nation of elders," particularly after 1930.[177] Indeed, Dublin was one of the first scholars who began to collect morbidity statistics within the United States, and had been deeply interested, as an employee of a major life insurance business, in the demographic changes toward the increase of elderly population that would profoundly alter the Company' future policy.[178] Yet he had quite a hopeful prospect on how this increased aged population would influence the nation, although he agreed with Dewey on some negative consequences of this change. He wrote, "With a greater proportion of accumulated wisdom in the nation, there will perhaps be a stronger tendency to curtail waste, to utilize the natural resources for the public good, and to guide more intelligently the channels of production and distribution."[179] Dublin also argued for the necessity of aging research as early as 1928, which, according to him, would increase

[173] Dewey, 1939, pp. xx–xxi.

[174] Ibid., p. xxi.

[175] Ibid., p. xxvi.

[176] Cowdry to Dewey, 6 May 1938, Box 26, Folder 42, EVC.

[177] Dublin, 1939, p. 112.

[178] Eyler, 2005, p. 39; Dublin, 1933. The Statistical Bulletin of Met Life also discussed the issue of aging many times. See, for example, Metropolitan Life Insurance Company, 1939.

[179] Dublin, 1939, p. 115.

the knowledge on improving the health of aged people.[180] Anthropologist Clark Wissler was another contributor who was interested in larger social and cultural aspects of aging. In his chapter, he wrote that "all societies have formulated concepts of age capacity and treated the individual accordingly," because "no society ignores age changes."[181] For him, aging was "deeply enmeshed in every form and state of culture," such as that of Ainu, Eskimo, and Tasmanian.[182] After describing how these different cultures developed distinct practices concerning old age, he argued that aging was not a pure biological phenomenon because it was defined and explained in different ways according to the culture of a society.

One of the most important things Cowdry did with these and other contributors for the establishment of gerontology was to hold the first conference on aging at Woods Hole, Massachusetts. Indeed, Cowdry had planned "informal conferences" with some contributors to *Human Biology*, and tried to do the same thing while editing *Problems of Ageing*.[183] Yet the Macy Foundation's support for travel expenses and other costs enabled him to hold a more formal conference on June 25 and 26, 1937 at Cape Codder Hotel in Woods Hole. There most contributors convened – including Carlson, Cohn, Crocker, Jennings, Krumbhaar, Oliver, McCay, MacNider, Todd, Wissler, Dublin, Miles, E. T. Engle, J. S. Friedenwald, and Cowdry himself. (See Figure 1) As the representatives of the Foundation, Lawrence Frank and Frank Fremont-Smith participated as well. Moreover, since Cowdry wanted to promote this conference as a national scientific meeting, he invited W. S. Hunter as the representative of the Union of American Biological Societies and E. D. Merrill from the National Research Council.[184]

The diversity of the fields these people represented was similar to the broad range of expertise of the researchers who regularly attended the Marine Biological Laboratory every summer.[185] The conference participants were also like the "cytologists" in Cowdry's previous textbooks, who, as specialists in their original fields, were interested in the

[180] Dublin, 1928, pp. 1085–1086.

[181] Wissler, 1939, p. 98.

[182] Ibid.

[183] Cowdry to Oliver, 17 February 1937, Box 33, Folder 4, EVC.

[184] "Woods Hole Conference on Aging," Box 94, Folder 1298, WBC; Cowdry, 1937. Indeed, he himself was president of the Union and had chaired the Division of Medical Sciences of the NRC.

[185] Although not mentioned by historians, Cowdry wrote that many physicians and medical researchers as well as zoologists studied there. See Garrey and Cowdry, 1925.

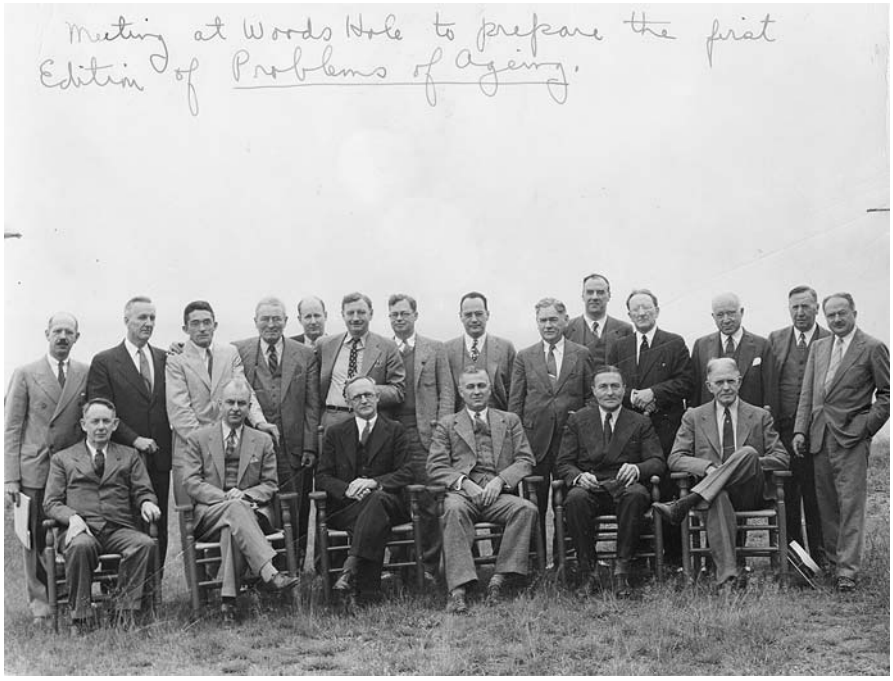

Figure 1. The Woos Hole Conference on Aging, 1937, Woods Hole, Massachusetts. Cowdry is sitting on the third chair from the right in the front row. (From the Nathan Shock Papers, Box 44, Folder Photographs, Professional, 1937–1958, Bentley Historical Library, University of Michigan, Ann Arbor, Michigan).

cell as the basic structural and functional element of various life processes. Furthermore, in terms of their common hope for developing the science of aging despite their diverse backgrounds, the participants resembled the cells in Cowdry's ''body anatomic,'' which matured and aged at a distinctive rate in their local environment while contributing to the welfare of the whole body.

During the formal sessions of the conference, these multidisciplinary scholars discussed various biological, medical, psychological, and social issues concerning aging and, according to McCay's recollection, thoroughly enjoyed leisure activities in their free time, just as biologists and doctors at the MBL had done.[186] McCay playfully wrote that Anton Carlson had some problems in joining the latter activity, since he forgot to bring his swimming suit.

[186] McCay, ''A Student of Aging Looks at the Macy Foundation for Seventeen Years,'' p. 2, Box 30, Folder Macy Foundation Contribution, NWS. Also see The Josiah Macy, Jr. Foundation, 1950, p. 33.

Cowdry intended to use this conference as a forum for furthering discussion among the contributors. He urged the participants of the conference to continue their conversation and to respond to others' writings by making "constructive suggestions leading to improvements."[187] Indeed, a few issues brought forth during the conference – such as whether aging was a result of "endless repetition of injury" or "supervention of degenerative disease" – continued to be discussed after it, during the final phase of the book editing.[188]

Although the official duties of the editor and the contributors ended with the publication of *Problems of Ageing* in January, 1939, their sense of belonging to a community continued. Under the leadership of Cowdry, some of these people – MacNider, Carlson, McCay, Crocker, Jennings, and Krumbhaar – formed the "Committee on the Biological Processes of Ageing" within the National Research Council on March, 1938.[189] Carlson also suggested that it might be necessary to have a second conference for further discussion after the contributors finished their chapters.[190] Although this suggestion was not immediately realized, an opportunity came when Vladimir Korenchevsky, a Russian–British gerontologist, visited America in July, 1939. He had already formed the Club for Research on Ageing in Great Britain, a small discussion group of biomedical scientists interested in aging. With his recommendation, American scientists of aging also formed a similar organization in the United States – "the American Division" of the Club for Research on Ageing.[191] This article will end with a brief discussion of the early phase of this Club and the later editions of *Problems of Ageing*.

Conclusion: The Emergence of Gerontology as a Multidisciplinary Scientific Field

When the first meeting of the Club was held on January 11 and 12, 1940 at Washington, D.C., many of the contributors to *Problems of Ageing*

[187] Cowdry, "Editorial Policy," p. 8, 28 July 1937, Box 33, Folder 31, EVC.

[188] Cowdry to Todd, 2 July 1937, Box 36, Folder 13, EVC; Todd to Cowdry, 12 July 1937, Box 36, Folder 13, EVC.

[189] See Cowdry to E. F. Williams, 18 August 1938, Box 42, Folder 22, EVC.

[190] Carlson suggested this during the Woods Hole Conference. MacNider to Cowdry, 30 June 1937, Box 31, Folder 8, EVC.

[191] MacNider to McCay, 19 July 1939, Box 6, Folder McCay, Clive [comments listed], NWS.

met again.[192] Although Jennings did not come after moving to California, Cowdry invited another prestigious biologist, Ross Harrison of Yale University, who was a founder of tissue culture techniques and chairman of the National Research Council. Robert A. Moore, Cowdry's colleague at Washington University and the first editor of *Journal of Gerontology*, was also present. Moreover, the Club invited Lewis Thompson, director of the National Institute of Health, along with Edward J. Stieglitz, who would be appointed as the first chief of the Unit on Gerontology within the NIH that would be established through the Macy Foundation's short-term grant. The Club also asked R. E. Coker to join the discussion as Chairman of the Division of Biology and Agriculture of the National Research Council to which the Committee on the Biological Processes of Ageing belonged. Lawrence Frank and Frank Fremont-Smith from the Macy Foundation paid these participants' travel expenses and participated in the discussion.

The multidisciplinary scholars discussed various issues. How and why should aging be studied as a scientific subject? What were the appropriate experimental organisms to study aging? What could the plant's potential immortality suggest on the nature of aging in general? How did chronic illnesses alter the pattern and mode of aging? How did nutrition affect the rate of aging in animals? How did the aging of the human population affect industry and what were American corporations' responses to their aged employees?

As well as these academic problems, the members of the Club discussed several issues related to its administration. First of all, at Cowdry's recommendation, MacNider was appointed the first president of the Club. Cowdry also asked a question that would be important for the future of gerontology: Was it appropriate and necessary for the Club to "enter into the social aspects of ageing?"[193] Although this question did not lead to any immediate action during the first meeting of the Club, other scholars such as Cannon, Stieglitz, and C. Hartman, showed interest in the social aspects of aging, and Cohn emphasized the importance of understanding the "social background" of senescence as well as its biomedical aspects.[194] It was also decided that the Club should be a small and informal discussion group of multidisciplinary scholars who were seriously concerned about aging. Their annual meeting had to be a roundtable discussion rather than formal presentations of articles by single scientists. In this sense, the Club was very

[192] "Meeting of the Club for Research on Ageing," p. 1.

[193] "Meeting of the Club for Research on Ageing," p. 8.

[194] Cohn to Frank, 2 February 1939, Box 10, Folder 8, AEC.

different from other scientific societies. As Moore aptly put it, this Club was "regarded as an experiment."[195]

Meanwhile, Cowdry kept editing new versions of *Problems of Ageing*. In 1942, its second edition was published with the contribution of the members of the Club. In this edition, several influential figures in gerontology newly joined, including psychologist George Lawton and clinician Edward Stieglitz, who returned to his private medical practice after leaving the NIH Gerontology Unit to a young physiologist, Nathan W. Shock. The third edition of *Problems of Ageing* came out 10 years later, with a number of new contributors. After Cannon died in 1945, Shock took charge of the chapter on the aging of homeostatic mechanisms. The "St. Louis Group of Gerontology" – John E. Kirk, William B. Kountz, and Albert I. Lansing, who were colleagues of Cowdry and Moore – was another new addition to the list of authors, and Lansing among them actually edited the book even though the book's title was *Cowdry's Problems of Ageing*. But the most remarkable development was the four new chapters on "Social and Economic Aspects of Aging." Basically, this was what Cowdry had in mind, at least vaguely, since he had worked on the first edition of the book. He had invited Dewey, Wissler, and Dublin to write about social implication of aging for the first and second editions.

However, gerontology already grew beyond the domain of *Problems of Ageing*. While gerontology handbooks continued to be published since then, the people Cowdry recruited for his book and the Club established the first formal professional society of American researchers on aging – the Gerontological Society in 1945. Moreover, the Unit on Gerontology in the NIH became a permanent institution, and Shock, who contributed to the third edition of *Problems of Ageing*, directed the unit from 1941 until it became the National Institute on Aging in 1974. Moreover, gerontology program began to be established in many academic institutions, such as Washington University, the University of Chicago, the University of Michigan, and Duke University.

Although Cowdry was not directly involved in all these events, he made substantial contributions to them in many ways. He was a leader of the St. Louis group of gerontology and served the Club for Research on Ageing as president from 1946 to 1948. He was also elected president of the Gerontological Society in 1953 and the International Association of Gerontology in 1951. The origins of these new multidisciplinary organizations he directed can be traced back to what he learned at Chicago and Woods Hole – the ideal of scientific cooperation and the

[195] "Meeting of the Club for Research on Ageing," p. 17.

hope that biologists could offer answers to social problems. Cowdry, with this ideal and hope along with his expertise in textbook editing, began to construct gerontology as a response to the problems of aging that emerged during the deeply troubling period of the Great Depression. His efforts contributed to the birth of the multidisciplinary field which aimed at offering its scientific expertise on the problems of senescence which would become increasingly significant in the era of aging population.

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