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Centenarian scientists: an unusual cluster newly formed in the 20th century

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Summary From biographical data sources on ranking scientists, I was able to identify 35 centenarians. Among these, only one (Michel Chevereul from France) lived before the 20th century. Since the remaining 34 individuals became centenarians only from 1965, I propose that centenarian scientists are an unusual cluster, first formed in the 20th century. Among these, all except one (Alice Hamilton) were men. Six centenarian scientists, including Hamilton, had received professional medical training. The nationality ranks of the 34 centenarian scientists identified in the 20th century show 26 Americans, 6 British, one German and one French. Four of the 26 Americans were immigrants from Europe. At least three centenarians, namely Michael Heidelberger, Nathaniel Kleitman and Victor Hamburger, belong to the 'Nobel class' category, being pioneers in the disciplines of immunochemistry, sleep physiology and neuroembryology respectively. © 2001 Harcourt Publishers Ltd

INTRODUCTION

In 1999, while reading a feature entitled 'Centenarians point the way to healthy ageing', published in the *Lancet* journal (1), it struck me that if centenarians are increasing globally, centenarian scientists also should show a proportionate increase. My short letter mentioning the names of six centenarian scientists (Michel Chevreul, Joel Hildebrand, Nathaniel Kleitman, Michael Heidelberger, Harry Benjamin and Thomas Sopwith) to this effect appeared subsequently in the *Lancet* (2). This letter elicited a response from Greenwood (3), who added the names of two malariologists, Rickard Christophers and H. E. Shortt. Later, when my *Lancet* letter was republished in the regular column contributed by Reese (4) to the *Chemical and Engineering News* weekly, it produced a significant number of responses from other correspondents (5–15). At the end of 2000, the number of centenarian scientists I assembled has reached 35. In this communication, I provide a summary of my findings on this new cluster.

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Viktor Hamburger sadly died June 12, 2001. [Lauder JM, Oppenheim R, Hamburger V (1900–2001). *Nature* 2001; **412**: 496.]

HYPOTHESIS

Hypothesis proposed: Centenarian scientists are an unusual cluster, first formed in the 20th century.

EVIDENCE

A search in the biographical data sources on scientists (16–19) shows that there has lived only one ranking centenarian scientist, namely Michel Chevreul from France, before the 20th century. Apart from those who had authentic qualifications as scientists, individuals with demonstrated aptitude for scientific and technical skills such as medical doctors, engineers, inventors and distinguished teachers of science were also included in this search.

Table 1 Life spans of centenarian scientists[1]

Scientist	DOB[2]	DOD[3]	Area of speciality	Reference
Michel Chevreul	1786.08.31	1889.04.09	lipid chemistry	17
James R. Barnett	1864.09.06	1965.01.13	naval architecture	17
Alice Hamilton	1869.02.27	1970.09.22	occupational medicine	18,19
Emmet Reid	1872	1973	chemistry	5
Floyd R. Watson	1872.04.23	1974.01.18	architectural acoustics	20,21
William D. Coolidge	1873.10.23	1975.02.03	physics, metallurgy	6,17
Rickard Christophers	1873.11.27	1978.02.19	malariology	3, 22
Arthur Lee Haines	1874	1975	chemistry	11
Joel H Hildebrand	1881.11.16	1983.04.30	physical chemistry	23–25
Henri Fabre	1882.11.29	1984.06.	marine engineering	17
Harry Benjamin	1885.01.12	1986.08	sexology	26
Col. Henry E. Shortt	1887.04.18	1987.11.09	malariology	3,27
Thomas O. Sopwith	1888.01.18	1989.01.27	aviation	17
Michael Heidelberger	1888.04.29	1991.06.25	immunochemistry	28,29
Frederick J. Schlink	1891	1995	mechanical engineering	7
Louis Hendler	1892	1994	ballistics chemistry	8
William Gould Dow	1895.09.30	1999.10.17	physical electronics	10
Nathaniel Kleitman	1895	1999.08.13	sleep physiology	18
Friedrich Hund	1896.02.04	1997.03.31	quantum chemistry	10
Marion Harman	1897.01.	living	chemical engineering	13
John F. Wilkinson	1897.06.10	1998.08.13	hematology	30,31
Philip Rice	1897.10.	living	industrial chemistry	15
Elwin E. Harris	1897.11.11	living	wood chemistry	9
Victor Mills	1897.03.28	1997.11.01	chemical engineering	12
Lt. Col. Brian D. Shaw	1898.02.10	1999.11.07	organic chemistry	32
Chaplin Tyler	1898.03.28	living	chemical engineering	10
Arthur Von Hippel	1898.11.18	living	insulation research	5
F. William Sunderman	1898.10.23	living	clinical chemistry	7
Waldo Semon	1898.09.10	1999.05.26	plastic chemistry	7,33
Lloyd M. Bertholf	1899.12.16	living	entomology	12
Joseph F. Kowalewski	1899.12.31	2000.03.30	physical chemistry	13
Ray H. Crist	1900.03.	living	chemistry	13
Arnold Beckman	1900.04.10	living	chemistry, invention	10,34
Victor Hamburger	1900.07.09	living	neuroembryology	35
Walter T. J. Morgan	1900.10.03	living	blood chemistry	14

[1]Arranged in chronological order of birth; [2]Date of Birth (Year/Month/Date): month and date are provided when known;
[3]Date of Death (Year/Month/Date): month and date are provided when known. For those identified as 'living', this information is valid as of the cited reference date.

At the end of the 20th century, the number of centenarian scientists, whose life spans have been authentically documented had increased to 35, including Chevreul. Among the 34 individuals who became centenarians following Chevreul, all but one (Alice Hamilton) were men. Table 1 provides a list of these centenarian scientists (16–35). Of the 34 centenarian scientists identified in the 20th century, 26 were from the USA; six (Christophers, Shortt, Sopwith, Wilkinson, Shaw and Morgan) were from Britain, and one each from Germany (Hund) and France (Fabre). Among the 26 American centenarian scientists, four (Benjamin, Kleitman, von Hippel and Hamburger) were immigrants born in Europe; Benjamin and von Hippel in Germany, Kleitman in Russia and Hamburger in Landeshut Silesia (then in Germany), now Poland. At least three among the 34 individuals identified in Table 1, were of 'Nobel class' stature. These three namely Heidelberger, Kleitman and Hamburger were pioneers in immunochemistry, sleep physiology and neuroembryology, respectively (Table 2). In fact, Hamburger has been assessed by his peers as unlucky to miss the 1986 Nobel prize in medicine, which was awarded to his junior colleagues Rita Levi-Montalcini and Stanley Cohen (35).

Six centenarians (Hamilton, Christophers, Benjamin, Shortt, Wilkinson and Sunderman) had received professional medical training and contributed noticeably to the areas of public health and medical education (Table 2). For instance, Christophers received his primary medical degree from the University College, Liverpool in 1896 and spent the next 35 years in Africa and India. Hamilton graduated from Harvard Medical School in 1897, and after becoming its first woman faculty member, dedicated her career to studies on industrial diseases.

DISCUSSION

It is a fact that globally centenarians are increasing in number (1). Thus, a simultaneous increase in the

Table 2 Notable scientific contributions of centenarian scientists

Scientist[1]	Notable Contribution to Science and Technology
Michel Chevreul	studies on chemical nature of fats; soap manufacture
James R. Barnett	improvements in life-boat designs
Alice Hamilton	initiation of studies on industrial diseases
Floyd R. Watson	founding the Acoustical Society of America in 1929
William D. Coolidge	development of modern X-ray tubes, ductile tungsten etc.
Rickard Christophers	discovery of sporozoites and oocytes in the malaria vector
Joel H Hildebrand	theory of regular solutions
Henri Fabre	aviation: designs in sea plane
Harry Benjamin	medical treatment of transsexuality
Col. Henry E. Shortt	elucidation of the liver cycle of malarial parasite
Thomas O. Sopwith	development of fighter aircrafts during First World War
Michael Heidelberger	studies in immunochemistry; designing refrigerated centrifuge
Frederick J. Schlink	methods for evaluation of consumer goods
Louis Hendler	development of tracer bullet
William G. Dow	advances in physical electronics, nuclear fusion
Nathaniel Kleitman	discovery of rapid eye movement (REM) sleep in humans
Friedrich Hund	molecular orbital theory; establishing Hund's rules
Marion Harman	development of rubber accelerators
John F. Wilkinson	first definitive cure for pernicious anemia
Victor Mills	development of disposal diaper, laundry detergent
Arthur Von Hippel	contributions to dielectrics; molecular engineering
F. William Sunderman	founding and editing *Annals of Clinical & Lab. Science*
Waldo Semon	invention of plasticized polyvinyl chloride (PVC)
Joseph F. Kowalewski	development of 'Preparation H' ointment for hemorrhoids
Arnold Beckman	designing first hand-help pH meter, quartz spectrophotometer
Victor Hamburger	establishing the field of neuroembryology
Walter T. J. Morgan	studies on chemical basis of ABO blood group determinants

[1]Arranged in chronological order of birth.

centenarian scientists is not unexpected. A total of 34 scientists who became centenarians in the 20th century, as identified in Table 1, is undoubtedly an underestimate, since possibilities exist for additions to this list, from other European nations as well as China, Japan and India. But, even with this reported number, one can infer that the stated hypothesis stands proved.

How the majority of the centenarian scientists spend their geriatric phase of their life spans has not been studied yet. Among those listed in Table 1, I could separate the centenarian scientists into two groups. One group belongs to those who were active in research, even in their late 90s. Individuals such as Hildebrand, Heidelberger, Dow and Sunderman have been recognized by their peers as contributing actively to research, even in their late 90s. Hildebrand for instance, published the majority of his 300-odd papers after his official 'retirement' and even co-authored a paper at the age of 100 (24,25). In contrast, the second group belongs to those who retired from active involvement in science at the nominal 65–70 years, and then continued to live until 100. I suggest that this second group can provide an ideal control for investigating the research productivity of scientists who were active until becoming centenarians. Currently a study is in progress along these lines.

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REFERENCES

1. Larkin M. Centenarians point the way to healthy ageing. *Lancet* 1999; **353**: 1074.
2. Sri Kantha S. Centenarian scientists. *Lancet* 1999; **353**: 2250.
3. Greenwood D. Centenarian scientists. *Lancet* 1999; **354**: 602.
4. Reese K. M. Eminent centenarian scientists multiplying. *Chem Eng News* 1999 Aug.2; **77**(31): 64.
5. Reese K. M. Two more centenarians. *Chem Eng News* 1999 Aug.23; **77**(34): 72.
6. Reese K. M. One more centenarian. *Chem Eng News* 1999 Aug.30; **77**(35): 96.
7. Reese K. M. Three more centenarians raise the total to 11. *Chem Eng News* 1999 Sept.27; **77**(39): 64.
8. Reese K. M. One more centenarian. *Chem Eng News* 1999 Nov.8; **77**(45): 56.
9. Reese K. M. The 13th centenarian. *Chem Eng News* 2000 Jan.24; **78**(4): 80.
10. Reese K. M. Centenarian scientists are multiplying regularly. *Chem Eng News* 2000 Apr.10; **78**(15): 80.
11. Reese K. M. Yet another centenarian. *Chem Eng News* 2000 May 22; **78**(21): 64.
12. Reese K. M. Two more centenarians. *Chem Eng News* 2000 Jun.12; **78**(24): 64.

13. Reese K. M. Centenarians galore. *Chem Eng News* 2000 Jul.3; **78**(27): 60.
14. Reese K. M. The 26th centenarian. *Chem Eng News* 2000 Oct.9; **78**(41): 80.
15. Reese K. M. Chemist featured on National Centenarian Day. *Chem Eng News* 2000 Oct.16; **78**(42): 80.
16. Millar D., Millar I., Millar J., Millar M. Chambers Concise Dictionary of Scientists, Cambridge: W & R Chambers Ltd, 1989, p. 89
17. Day L., McNeil I., eds. Biographical Dictionary of the History of Technology, Routledge Reference, London, 1996.
18. Bendiner J., Bendiner E. Biographical Dictionary of Medicine, Facts on File, New York, 1990.
19. Uglow J., ed. The Macmillan Dictionary of Women's Biography, 2nd edn. London: Macmillan Press Ltd, 1989: 245–246.
20. Anon. Floyd R. Watson celebrates 100th birthday. *Phys Today* 1972; **25**(7): 67.
21. Anon. Floyd Rowe Watson. *Phys Today* 1974; **27**(8): 69.
22. Garnham C. Sir (Samuel) Rickard Christophers. In: Lord Blake., Nicholls C. S., eds. Dictionary of National Biography 1971–1980. Oxford: Oxford University Press, 1986: 146–147.
23. Roberts D. Hildebrand's second century. *Chem Tech* 1982; **12**: 656–657.
24. Smith E. B. Joel Hildebrand 1881–1983. *Chem Brit* 1983; **19**(12): 1014.
25. Hildebrand J. H., Lamoreaux R. H., Loomis A. G. The state of hydrogen in liquid metals. *High Temp Sci* 1981; **14**(1): 51–54.
26. Francoeur R. T. ed. A Descriptive Dictionary and Atlas of Sexology, Westport, CT: Greenwood Press, 1991: 60.
27. Anon. Colonel H. E. Shortt. *Brit Med J*, 1987; **295**: 1424.
28. Kabat E. A. Michael Heidelberger — active at 100. *FASEB J* 1988; **2**: 2233–2234.
29. Kabat E. A. Michael Heidelberger April 29, 1888—June 25, 1991. *J Immunol* 1992; **148**: 301–307.
30. Cuthbert W. John Wilkinson, 1897–1998. *Chem Brit* 1998; **34**(12): 54.
31. Pengelly C. D. R., Geary C. G. John Frederick Wilkinson. *Brit Med J* 1999; **318**: 130.
32. Anon. B. D. Shaw medal. *Chem Brit* 1998; **34**(3): 13.
33. MacDermott K. Inventor of vinyl dies at 100. *Chem Eng News* 1999; **77**(28): 37.
34. Wilson E. Arnold Beckman at 100. *Chem Eng News* 2000 Apr.10; **78**(15): 17–20.
35. Brown K. A lifelong fascination with the chick embryo. *Science* 2000; **290**: 1284–1287.