

SENATE JOINT RESOLUTION 1

By Haile

A RESOLUTION to commend Dr. Joseph H. Hamilton for his pivotal role in the discovery of element 117 and its naming as tennessine.

WHEREAS, it is fitting that the members of this General Assembly should pause to specially recognize those citizens whose laudable efforts have contributed to significant scientific breakthroughs; and

WHEREAS, one such person who evinces the greatest integrity in all his chosen endeavors is Dr. Joseph H. Hamilton, who played a pivotal role in the discovery of element 117 and its naming as tennessine; and

WHEREAS, a renowned professor of physics at Vanderbilt University, Dr. Hamilton officially proposed that the new element on the periodic table be named "tennessine" in recognition of the significant contributions made by Tennessee research centers Oak Ridge National Laboratories (ORNL), Vanderbilt University (VU), and the University of Tennessee-Knoxville (UT-K); and

WHEREAS, the impetus behind the discovery of element 117 grew out of a 2005 meeting at Vanderbilt University in which Dr. Yuri Oganessian, leader of the team from the Joint Institute for Nuclear Research (JINR), Dubna, Russia, asked Dr. Hamilton, with whom he had collaborated in nuclear research for fifteen years, to join him in obtaining a Berkelium (Bk) target to search for the new element with atomic number 117; upon visiting ORNL's High Flux Isotope Reactor, they learned that the most economical way to produce Bk was during the production of Californium (Cf); and

WHEREAS, in August 2008, when Dr. Hamilton learned the production of the Bk-Cf material was underway at ORNL, Dr. Hamilton arranged a collaboration with Dr. Oganessian and Dr. James Roberto, Deputy Director for Science and Technology, ORNL, to discover element 117; he subsequently invited scientists at Lawrence Livermore National Laboratory

(LLNL), Livermore, California, to join the collaboration. If the venture proved successful, it was proposed by Dr. Hamilton that the new element be named in honor of the State of Tennessee; and

WHEREAS, working with Dr. Hamilton at Vanderbilt University was his colleague Dr. Akunuri V. Ramayya, who traveled with Dr. Hamilton to Russia to participate in experiments and collaborated in the analysis of data and in the writing of the scientific research findings; and

WHEREAS, superheavy element research conducted in Tennessee included the production and chemical separation of unique actinide target materials at ORNL's High Flux Isotope Reactor and Radiochemical Engineering Development Center, the production of which contributed to the discovery and confirmation of six superheavy elements and completion of the seventh row of the periodic table; and

WHEREAS, the discovery of tennessine, along with elements 113, 114, 115, 116 and 118, provides evidence for the long sought "island of stability," a concept that predicted nearly fifty years ago increased stabilities and much slower rates of decay for superheavy elements with higher numbers of neutrons and protons than those previously known; and

WHEREAS, Dr. Hamilton is a driving force behind Tennessee's emergence as a world leader for graduate education and research in nuclear physics; his fields of interest include experimental nuclear physics, nuclear structure, nuclei far from stability, heavy ion reactions, and superheavy elements; and

WHEREAS, born in Ferriday, Louisiana, Dr. Hamilton received a Bachelor of Science degree from Mississippi College in 1954 and a Master of Science degree and a Doctor of Philosophy degree from Indiana University in 1956 and 1958, respectively; he also received Doctor of Science (Honorary) degrees from Mississippi College in 1982, Berea College in 2007, and Eastern Kentucky University in 2012, Doctor Philosophiae Naturalis Honoris Causa degrees from Johann Wolfgang Goethe-Universität, Frankfurt, Germany, in 1992, University of Bucharest, Romania, in 1999, St. Petersburg University, Russia, in 2001, Joint Institute for Nuclear Research, Russia, 2004, and Shukla University, India, in 2005; and

WHEREAS, in addition to serving as the Landon C. Garland Distinguished Professor of Physics at Vanderbilt University from 1992 to present, Dr. Hamilton has also served as Director, Joint Institute for Heavy Ion Research, ORNL, from 1982 to present; Adjunct Professor of

Physics, Tsinghua University, China, from 1986 to present; Honorary Advisory Professor, Fudan University, Shanghai, China, from 1988 to present; and Visiting Distinguished Laboratory Fellow, ORNL, from 2000 to present; and

WHEREAS, among Dr. Hamilton's many previous appointments are Postdoctoral Research Associate, Indiana University (1958); National Science Foundation Postdoctoral Fellow, University of Uppsala, Sweden (1958-1959); Assistant Professor of Physics, Vanderbilt University (1958-1962); a research appointment from the Institute for Nuclear Physics Research, Amsterdam, Netherlands (1962-1963); Associate Professor of Physics, Vanderbilt University (1962-1966); Professor of Physics, Vanderbilt University (1966-1981); Centennial Fellow, Vanderbilt University (1974-1975); Senior Alexander von Humboldt Fellow, University of Frankfurt/Main (1979-1980); and Chairman, Department of Physics & Astronomy, Vanderbilt University (1979-1985); and

WHEREAS, most notably, Dr. Hamilton initiated and established the first major research facility in the United States to study nuclei far from stability; creating unique partnerships with the State of Tennessee, the federal government, and public and private universities, he founded the University Isotope Separator at Oak Ridge, UNISOR, a consortium of twelve universities, in 1971; and

WHEREAS, in 1981, Dr. Hamilton founded the Joint Institute for Heavy Ion Research (JIHIR) in Oak Ridge supported by Vanderbilt University, the University of Tennessee-Knoxville, and ORNL; he is also the institute's first director, in which capacity he ably guided the institute from 1981-1987, and he has continued his astute leadership in that role since 1991; and

WHEREAS, in the 1990s, Dr. Hamilton helped design and raise the funds, including significant support from the State of Tennessee, for a new generation recoil mass separator at ORNL that opened up new areas of research there; and

WHEREAS, an active and dynamic member of his profession, Dr. Hamilton is a Fellow of the American Physical Society and a Fellow of the American Association for the Advancement of Science; he is also a Foreign Member of Academia Europea, the Academy of Arts and Science of Europe, a member of the American Association of Physics Teachers, Southeastern Section American Physical Society, as well as a member of Sigma Xi and Sigma Pi Sigma; and

WHEREAS, no stranger to accolades, this devoted professional is the recipient of numerous honors, including Outstanding Educator of America (1973), Jesse Beams Gold Medal for Outstanding Research - Southeastern Section of the American Physical Society (1975), Senior Alexander von Humboldt Prize - Federal Republic of Germany (1979), Harvie Branscomb Distinguished Professor - Vanderbilt University (1983-1984), Order of Golden Arrow Outstanding Alumni Award - Mississippi College (1985), George Pegram Award for Outstanding Teaching - Southeastern Section of the American Physical Society (1988), Earl Sutherland Prize for Excellence in Research - Vanderbilt University (1988), and Guy and Rebecca Forman Award for Excellence in Teaching of Physics - Vanderbilt University (1990), and was named the Council for Advancement and Support of Education's Outstanding Professor of the Year for the State of Tennessee (1991); and

WHEREAS, Dr. Hamilton has also been honored with the Thomas Jefferson Award for Outstanding Service to Vanderbilt University (1995), the American Association for the Advancement of Science Award for International Cooperation (1996), the Jeffery Nordhaus Award for Excellence in Undergraduate Teaching - Vanderbilt University (1996), the Francis Slack Gold Medal Award for Outstanding Service to Physics - Southeastern Section American Physical Society (2000), the First Outstanding Leadership Award, Oak Ridge Associated Universities (2000), the Ilkovic Gold Medal for Career Achievements in Science, Slovak Academy of Science (2001), and the Flerov Prize for Major Achievements in Nuclear Physics Research, Russia (2003); he holds the distinction of being one of ninety living Tennesseans honored with a biographical sketch in the *Tennessee Encyclopedia of History and Culture* (1998); and

WHEREAS, a selection of the over 1,100 publications of which Dr. Hamilton contributed to as an author or editor includes "University Isotope Separator at Oak Ridge: A Report of the UNISOR Consortium" (1974), "Evidence for Deformed Ground States in Light Kr Isotopes" (1981), "Effects of Reinforcing Shell Gaps in the Competition Between Spherical and Highly Deformed Shapes" (1984), "New Insights from Studies of Spontaneous Fission with Large Detector Arrays" (1995), "Modern Atomic and Nuclear Physics" (1996), "Octupole Correlations in Neutron-Rich  $^{143,145}\text{Ba}$  and a Type of Superdeformed Band in  $^{145}\text{Ba}$ " (1999), "Advances in the Spherical Shell Model: Shape Coexistence, Reinforcing Shell Gaps and Deformed Double

Magic Nuclei" (1999), "Performance of the Recoil Mass Spectrometer and its Detector Systems at the Holifield Radioactive Ion Beam Facility" (2000), Superdeformation to Maximum Triaxiality in A=100-112: Superdeformation, Chiral Bands and Wobbling Motion" (2010), and "Synthesis of a New Element with Atomic Number 117" (2010); and

WHEREAS, as a result of Dr. Hamilton's insight and initiative, an international team of scientists at JINR including VU, ORNL, and LLNL conducted the first experiment to successfully produce element 117; its discovery was confirmed through identical experiments conducted independently by GSI Helmholtz Center for Heavy Ion Research in Darmstadt, Germany; and

WHEREAS, having participated in every aspect of the discovery of element 117, on his next visit to Russia, Dr. Hamilton was introduced by Dr. Oganessian to his colleagues as "the father of 117"; and

WHEREAS, in December 2015, the Joint Working Party of the International Union of Pure and Applied Chemistry (IUPAC) and the International Union of Pure and Applied Physics (IUPAP) officially recognized the discovery of element 117, provisionally known as ununseptium, the second heaviest known element; as of 2016, twenty-one ununseptium atoms have been observed; and

WHEREAS, elements are permanently named for a deceased outstanding scientist or the person who made the discovery or for the region where the laboratories that made the discovery are located; to be so named is one of the highest honors in science; and

WHEREAS, in June 2016, IUPAC published a declaration stating that the Russian, ORNL, VU, and LLNL collaborators of the discovery had submitted their recommendation for naming the new element 117 "tennessine," with a symbol of Ts, after "the region of Tennessee"; and

WHEREAS, Tennessee is only the second American state to receive this distinction, one of the highest honors in science; Dr. Hamilton observed that "the name of the State of Tennessee will be in the periodic table in textbooks of physics and chemistry worldwide forever"; and

WHEREAS, "The new nuclei produced in this research have substantially increased lifetimes consistent with landing on the shores of the long theoretically predicted 'Island of Stability,'" said Dr. Hamilton. "These discoveries give evidence for the island's existence, and

the new elements themselves represent a major advance in our understanding of the behavior of nuclear matter under the extreme stress of the ultra-large electrical forces that exist between the high numbers of protons that are packed into these new nuclei."; and

WHEREAS, throughout his estimable career, Dr. Hamilton has demonstrated the utmost professionalism, ability, and integrity, and it is fitting that the members of this General Assembly pause in their deliberations to applaud the remarkable achievements made by this exceptional scientist, public servant, and human being; now, therefore,

BE IT RESOLVED BY THE SENATE OF THE ONE HUNDRED TENTH GENERAL ASSEMBLY OF THE STATE OF TENNESSEE, THE HOUSE OF REPRESENTATIVES CONCURRING, that we hereby honor Dr. Joseph H. Hamilton for his prominent role in the discovery of element 117 and its naming as tennessine, commend his exemplary tenure as a professor of physics at Vanderbilt University, and extend to him our sincerest wishes for every continued success and happiness in his future endeavors.

BE IT FURTHER RESOLVED, that an appropriate copy of this resolution be prepared for presentation with this final clause omitted from such copy.