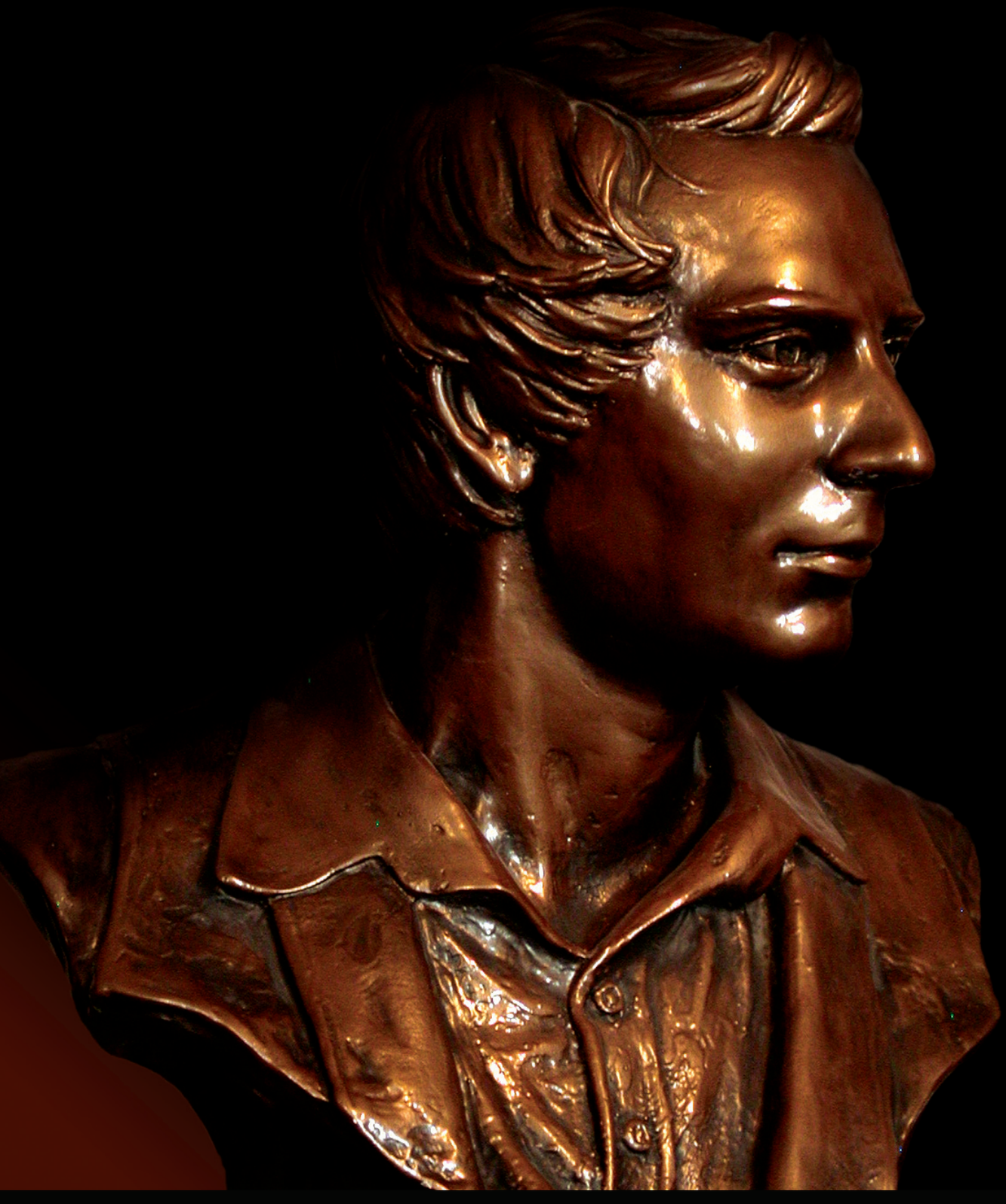
The Journal of Collegium Aesculapium



FALL 2005

Timely medical topics, special Church commemorative articles, and an opportunity to contribute to history

In this anniversary year of celebration for members of The Church of Jesus Christ of Latter-day Saints, it's only fitting that this issue of the *Journal of Collegium Aesculapium* include both addresses and exclusive articles examining the impact of Joseph Smith and the legacy of faith and integrity he left behind.

In "Joseph Smith: A Visionary Man", BYU associate dean of religious education Matthew Richardson takes us through the remarkable revelatory experiences of the prophet Joseph and provides insight into his extraordinary capacity to learn from all sources. You'll also enjoy Elder Cree-L Kofford's masterful address to Collegium last fall detailing the personal affection and bonds stronger than death that united Joseph and his beloved Emma.

Along the clinical track, you'll enjoy two very timely articles outlining major worldwide health risks from two very different sources. First, Dr. John Matsen and Jeri Larsen detail the ticking time-bomb of avian influenza that is only now being recognized in critical healthcare agencies worldwide. Then, you'll definitely want to read Drs. Johnson and Morse regarding the lurking threat of a terrorist-initiated smallpox outbreak. I was particularly intrigued by a U.S. exercise in which only 1 out of 17 physicians could identify smallpox in a patient; in another study, only 1/3 of physicians could answer critical symptomatic questions regarding smallpox. Timely, indeed.

You'll also enjoy an update from Elder John Carmack on the Perpetual Education Fund and its success in helping young adults in developing countries get education in healthcare professions, among others. This exceptional issue concludes with Dr. Cecil Samuelson's thought-provoking address to Collegium earlier this year on the quality of "meekness" in the whole physician.

One final note—on the cover, you'll see the exquisite work of renowned LDS sculptor Dee Jay Bawden. While you may not know his name, you'd likely recognize many of his pieces, including the Joseph and Hyrum martyr statue at Carthage, Ill. (right), the Christus in the Legacy Theater in Salt Lake City, and countless others. Attendees to the Collegium meetings this fall in Palmyra, N.Y. will be among the first to see a remarkable new "First Vision" piece debuting in that historic site.

Most historical sculptures requested by the Church for its venues cost many thousands of dollars, which of necessity must be donated. If you are interested in sponsoring current works in progress for the Conference Center and other sites, please contact Collegium as noted on the following page.

We hope you enjoy another meaningful issue of the *Journal*.

Ken Meyers, MBA
MANAGING EDITOR

Ken Meyers serves as vice president of AdvancedMD Software in Salt Lake City, Utah.

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In a troubled world, physicians and healthcare professionals who are members of the Church of Jesus Christ of Latter-day Saints have the benefit of spiritual insights as well as the art and science of medicine.

Collegium Aesculapium addresses the ethical and spiritual as well as the physical aspects of medicine. Thus, we invite qualified professionals to embrace the Collegium and take advantage of insightful meetings and seminars, newsletters, service opportunities, and the *Journal of Collegium Aesculapium*, all of which include this important expanded dimension, as well as the constantly changing body of scientific information available to us.

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Cover: Joseph bust by DJ Bawden. Photograph by Ken Meyers.
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THE JOURNAL OF
COLLEGIUM AESCULAPIUM
FALL 2005

Manuscripts considered for publication in the *Journal of Collegium Aesculapium* must be clinically appropriate and spiritually consistant with the the principles and doctrines of The Church of Jesus Christ of Latter-day Saints. All manuscripts must be clearly written and submitted in a double-spaced 12-point font in a Microsoft Word or WordPerfect e-mail attachment. A manuscript that meets these standards is peer reviewed by several members of the editorial board and is evaluated with the reviews by the editorial staff. After suggested content adjustments are made, an article may be accepted, edited to our standards of style and readable writing, and published in the *Journal*.

Manuscript submissions should be emailed to:
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THE JOURNAL
OF COLLEGIUM
AESCULAPIUM

FALL 2005

Joseph Smith: A Visionary Man

by Matthew O. Richardson

Not long ago, *U.S. News and World Report* produced a "Special Collector's Edition" of articles dealing with religion entitled *Mysteries of Faith*. This "bookazine" included, among other religions, Judaism, Catholicism, Hinduism, Islam, and evangelism.[1] Not surprisingly, the Church of Jesus Christ of Latter-day Saints, which is growing not only in membership but in general public awareness as well, was also included.

What was surprising, however, was the glaring editorial miscue dealing with the Latter-day Saint article. Unlike typical reporting inaccuracies and lack of clarity that one often encounters when reading articles dealing with the Church of Jesus Christ of Latter-day Saints, this particular error caused more befuddlement than ire. Oddly enough, it was the title of the article, *In John Smith's Steps*, and not the content (although problems exist there as well) that created most of the fuss. When asked about the error, *U.S. News and World Report* spokesman Richard Folkers said, "Somebody took a snooze at the keyboard."[2]

Surely some might think such an error to be minor, after all, Smith has been the most common American surname since 1790, and both "John" and "Joseph" have ranked among the most common American first names for centuries. It may also be presumed that, in the larger scheme of things, juxtaposing a "John" with a "Joseph" is inconsequential. But when discussing religion, restored truth, and eternal salvation, it is precisely because of the larger scheme of things that such an error is so consequential and that only in "Joseph Smith's" steps can these things be properly understood. To help keep this in proper perspective, consider Joseph Smith's eulogy, where John Taylor wrote, "Joseph Smith, the Prophet and Seer of the Lord, has done more, save Jesus only, for the salvation of men in this world, than any other man that ever lived in it."[3] Obviously, he who bears one of the most common names in history has made an uncommon contribution to God's kingdom.

This year Latter-day Saints commemorate the 200th anniversary of Joseph Smith's birth. Born in obscure Sharon, Vermont, in 1805 to humble farmers struggling to maintain their very existence, Joseph was the fifth child of Lucy Mack Smith and Joseph Smith Sr. During this anniversary year, most Latter-day Saints will make a pilgrimage in one form or another to Sharon and will read, hear about, or even visit the place where Joseph Smith was born. Those who visit Sharon may be surprised to find the area simple and nearly indistinguishable from the rest of the landscape. Undoubtedly, sometime during this commemoration, most Latter-day Saints will revisit stories of Joseph's youth which, much like the Vermont landscape, are just as ordinary as his name. His own mother, Lucy Mack Smith, said, "It is thought by some that I shall likely tell many remarkable incidents which attended his childhood; but, as nothing occurred during his early life except those trivial circumstances which are common to that state of human existence, I pass them in silence."[4] Unlike his ordinary birth and childhood which might have been "passed in silence," what Joseph Smith contributed during his short life was so extraordinary that one cannot ignore it; even his common name will not be silenced (or mistaken), for it was prophesied that "the ends of the earth shall inquire after" it.[5]

Joseph Smith possessed many admirable qualities and made many significant contributions to further the kingdom of God. What made Joseph Smith so extraordinary, however, was that he was a visionary man.

Even before Joseph Smith's humble birth in Sharon, Vt., his extraordinary contribution was foretold. Joseph of Egypt prophesied that a seer would be a deliverer "like unto Moses"[6] and that "his name shall be called after me; and it shall be after the name of his father."[7] It was also prophesied that this "choice seer" named Joseph would bring forth "the knowledge of the covenants" and "do whatsoever work [the Lord] shall command him."[8] In December 1834, Joseph Smith Sr. laid his hands upon his son, Joseph Jr., and gave him a father's blessing. In that blessing, Joseph's pre-mortal calling as the "choice seer" was reaffirmed, and Joseph was told, "Thy God has called thee by name out of the heavens…to do a work in this generation which no other man would do as in the last days."[9]

Brigham Young also recognized that Joseph Smith Jr. was the prophesied seer and testified that "it was decreed in the counsels of eternity, long before the foundations of the earth were laid, that he should be the man, in the last dispensation of this world, to bring forth the word of God to the people, and receive the fullness of the keys and power of the Priesthood of the Son of God."[10] In a commemorative year where stories involving Joseph Smith and his ancestry will be revisited, many will join Brigham Young in the opinion that, "the Lord had his eye upon him [Joseph Smith], and upon his father, and upon his father's father, and upon their progenitors."[11] Thus, it was providence that Joseph Smith was positioned to make his uncommon contribution as the prophesied seer.

Joseph Smith possessed many admirable qualities and made many significant contributions to further the king–dom of God. What made Joseph Smith so extraordinary, however, was that he was a visionary man. Historically, a *visionary* has been defined in two ways: (1) "one who has visions" and (2) "one who indulges in fantastic ideas."[12]

Based on the first of these definitions, Joseph was destined to become a visionary man because he was, after all, the prophesied *seer* or "one who sees—visions."[13] In recalling his first vision, Joseph Smith said, "it was nevertheless a fact that I had beheld a vision. […] I knew it, and I knew that God knew it, and I could not deny it, neither dared I do it; at least I knew that by so doing I would offend God, and come under condemnation."[14] In this sense, Joseph Smith aligned himself with another visionary of the past, Lehi, who also freely admitted, "I know that I am a visionary man."[15]

Oddly, while some equated visionary with enlightenment and freedom, others used the term in derision and associated it with bondage. Joseph was surprised that all did not share his view of a visionary. After sharing his first visionary experience, for example, people would point and exclaim in scorn and disgust, "There goes that visionary boy!"[16] Once again, this parallels Lehi's experience where the label visionary was not used as a compliment but to insult and shame Lehi.[17] Fortunately for Joseph, however, there were others who honored and held the visionary mantle in high esteem and, thus, provided necessary support to him in his prophesied role. Consider, for example, when Solomon Chamberlain visited the Smith's after hearing of Joseph's visions and revelations. Upon arriving at the Smith home, Solomon Chamberlain inquired: "Is there any one here that believes in visions or revelations?" Hyrum Smith answered, "Yes, we are a visionary house."[18]

Joseph's visions did not cease in 1820 but continued throughout his life. Trying to account for all of Joseph's visions would be unprofitable—for not all of his visions were recorded. When Joseph said that visions would "roll like an overflowing surge, before [his] mind,"[19] one can't help but get the feeling that Joseph probably received a great many visions. While having visions did qualify Joseph as a visionary man, the number of revelations did not determine the significance of his uncommon contribution—his legacy. "In all else that he accomplished in his brief 38 and a half years," Elder Jeffrey R. Holland taught, "Joseph left us above all else the resolute legacy of divine revelation—not a single, isolated revelation without evidence or consequence, and not 'a mild sort of inspiration seeping into the minds of all good people' everywhere, but specific, documented, ongoing directions from God."[20] For Joseph, his role as a visionary profoundly shaped his life.

Joseph was typically described as one who was "scarcely in possession of an ordinary common school education."[21] We must be careful that such statements do not frame our perceived image of Joseph Smith as nothing more than a country bumpkin. In an attempt to determine whether the evil reports about Joseph were true, William Clayton spent some time with the prophet. After meeting Joseph, William Clayton noted, "We have had the privilege of conversing with Joseph Smith Jr. and […] he is not an idiot [as evil reports about him claim], but a man of sound judgment, and possessed of abundance of intelligence, and whilst you listen to his conversation you receive intelligence which expands your mind and causes your heart to rejoice."[22] Another observer described Joseph as possessing "the innate refinement that one finds in the born poet, or in the most highly cultivated intellectual and poetic nature; and this extraordinary temperament and force combined in something of a miracle and can scarcely be accounted for except as a 'heavenly mystery' of the 'higher sort.'"[23] This "heavenly mystery" not only set Joseph Smith noticeably apart from others, but it also provided him with a unique education.

For Joseph Smith, it never was a matter of *what* he knew as much as it was the *source* from whence his knowledge came. From the very beginning, Joseph's education was dependant upon the legacy of divine revelation. "The best way to obtain truth and wisdom," Joseph taught, "is not to ask it from books, but to go to God in prayer, and obtain divine teaching."[24] It is important to note that Joseph's specific quest in approaching God was to "obtain divine teaching." Thus, he petitioned not just for answers but for the opportunity to be taught by whatever means God appointed. This is important, for the pedagogy of Joseph's revelatory education did not always come as a divine "Q and A" session with God.

Joseph was tutored by a variety of methods. His unique education began with events that eventually led to the first vision in 1820. Long before Joseph entered the grove to petition for divine instruction, he was taught by his parents, siblings, ministers and neighbors, his own musings, scriptures, and promptings of the Holy Ghost that "seemed to enter with great force into every feeling of [his] heart."[25] Later, Joseph taught that "by learning the Spirit of God and understanding it, you may grow into the principle of revelation, until you become perfect in Christ Jesus."[26] This form of revelation was a powerful educational tool. "This first Comforter or Holy Ghost has no other effect than pure intelligence," Joseph taught. "It is more powerful in expanding the mind, enlightening the understanding, and storing the intellect with present knowledge."[27] All of these experiences nudged Joseph into the grove. Joseph's plan for seeking knowledge was simple: He would petition God and let the rest unfold of its own accord.

As his peers were learning lessons from teachers in schoolhouses and then at universities, Joseph Smith was a being tutored by heavenly messengers. Joseph was visited by Moroni, John the Baptist, Peter, James, John, Moses, Elias, and Elijah. His divine teachers were not limited only to those dealing with responsibilities of priesthood restoration, however. According to George Q. Cannon, Joseph was "visited constantly by angels."[28] Mormon, Moroni, Nephi, and other ancient prophets visited Joseph and "communicated to him certain principles pertaining to the Gospel."[29] It is certain that Joseph learned new doctrines and concepts as he translated the Book of Mormon text. But, consider the additional depth, understanding, and clarity he gleaned from conversing with those who actually wrote the text. Apparently, Joseph was just as familiar with the ancient prophets, apostles, and patriarchs from the old world (Abraham, Isaac, Jacob, Noah, Adam, Seth, and Enoch) "as we are one with another."[30] In addition to the divine messengers, Joseph also dreamed dreams, saw visions, and used the Urim and Thumim to discover God's truths. While Joseph's means of garnering knowledge was not common of his day, he was educated nonetheless. Because he was a visionary man, his education was, in so many ways, more comprehensive than others of his time. With this in mind, it is not surprising that is was once said that Joseph Smith possessed "an infinity of knowledge."[31]

The life-long impact of divine revelation and how it shaped Joseph Smith can be seen in one of his great last public sermons. In April 1844, Joseph spoke at the funeral of King Follett in Nauvoo.[32] He stood before a large crowd and preached on 27 doctrinal topics that ranged from the character of God to the salvation of mankind. In short, this was not the typical Sunday sermon. Those acquainted with this discourse are aware that its contents

are not mainstream Christian doctrines. In fact, this sermon has become one of the few discourses frequently quoted by the faithful and the antagonist alike. Unfortunately, those who concentrate exclusively on the topics covered in this sermon risk overlooking and missing the grand point of the discourse altogether. What is most striking about this particular sermon is that it is a clarion testimony of the impact of revelation in Joseph Smith's life and his role as a *visionary* man—in every sense of the word.

Consider once again the full scope of the definition for *visionary.* A visionary is "one who receives visions" and/or "one who indulges in fantastic ideas." When considering the Follett sermon, let's begin with the second definition of a visionary, "one who indulges in fantastic ideas." It doesn't take much effort to realize that this sermon pushed the envelope of traditional Christian doctrine. Almost every principle taught in the sermon would have likely been considered "fantastic" by those unfamiliar with Joseph or the restoration. Consider, for example, how Joseph's teachings regarding the true character of God were in sharp contrast to common beliefs held both then and now. Yet, pushing the envelope of religious tradition and conventional doctrine was not an unexpected outcome for the visionary Joseph Smith. This was not because he was trying to upset the status quo, but because time, tradition, and manipulative theologians had redefined truth. "What he had to communicate," John Taylor said of Joseph Smith, "was so much more comprehensive, enlightened and dignified than that which the people generally knew and comprehended."[33] Thus, it seemed that almost anytime Joseph shared those things he was divinely taught, the theological boat was rocked.

As a result, Joseph bridled his teaching and only taught a part of his knowledge. "His mind was opened by the visions of the Almighty," Wilford Woodruff said, "and the Lord taught him many things by vision and revelation that were never taught publicly in his day; for the people could not bear the flood of intelligence which God poured into his mind."[34] Apparently it was not only a stretch for people to bear the knowledge proffered by Joseph Smith, but because the concepts were so fantastically different from what they knew and understood, many found it difficult to support such ideas and the prophet as well. Joseph once told Brigham Young in Kirtland, "Brother Brigham, if I was to reveal to this people what the Lord has revealed to me, there is not a man or a woman would stay with me."[35]

Differences between religious tradition and divine truth should have been expected, however. Isaiah taught, "For my thoughts are not your thoughts, neither are your ways my ways, saith the Lord. For as the heavens are higher than the earth, so are my ways higher than your ways, and my thoughts than your thoughts."[36] Regardless how fantastic the idea may appear to others, the gap between traditional religious understanding and divine revelatory truth didn't seem to bother the visionary Joseph Smith. He, like Isaiah, understood and taught, "God dwells in eternity, and does not view things as we do."[37]

> Joseph's plan for seeking knowledge was simple: he would petition God and let the rest unfold of its own accord. Thus, he petitioned not just for answers but for the opportunity to be taught by whatever means God appointed.

Not only was the Follett sermon a classic example of Joseph Smith's visionary ways in terms of teaching fantastic ideas, but it also underscored Joseph's direct connection with revelation once again. If one were to carefully read the sermon, it would become apparent that without additional revelation, a scriptorian, minister, philosopher, or theologian could not concoct this discourse. Only a visionary, one who received revelation, could have put such a sermon together. Every topic in the Follett sermon was received or expanded by revelation. Thus, both the depth and breadth of this sermon makes perfect sense only when one considers it in connection with all that Joseph had learned during the last 24 years of his life—via revelation. "I have the whole plan of the kingdom before me," Joseph said, "and no other person has."[38] It was through revelation that every step of the restorative journey was completed so God's plan could be ultimately understood.

The sermon's coup de grace comes when Joseph underscored his visionary role at the conclusion of the Follett sermon. Joseph said, "You don't know me; you never knew my heart. No man knows my history. I cannot tell it: I shall never undertake it. I don't blame any one for not believing my history. If I had not experienced what I have, I could not have believed it myself."[39] Unfortunately, many have misunderstood, or misinterpreted, this phrase. To correctly understand it, one must consider the context from which the entire sermon was framed. Joseph had just finished teaching doctrines that pushed the very limits of traditional religious understanding. Each of the doctrines taught in the sermon were given to Joseph Smith through revelation. Thus, in this context, Joseph was highlighting his unique experience of being tutored by God and divine messengers. Apparently, Joseph felt

that the Saints in Nauvoo, as Richard Lloyd Anderson explains, "did not fully appreciate his encounters with God, even though they were informed about his early visions."[40] Joseph was emphasizing that the Saints did not fully understand the significance of his revelatory history and, thereby, could not know him. Even those who knew about the revelations could not fully understand the significance of learning through divine tutors without experiencing it for themselves. Several months before the Follett sermon, Joseph taught, "Reading the experience of others, or the revelation given to them, can never give us a comprehensive view of our condition and true relation to God. Knowledge of these things can only be obtained by experience through the ordinances of God set forth for that purpose. Could you gaze into heaven five minutes, you would know more than you would by reading all that ever was written on the subject."[41]

It should not be construed that Joseph was implying that only he could fully benefit from his revelatory experiences. In 1839, Joseph taught that every Saint could come to know what he knew. "God hath not revealed anything to Joseph [referring to himself by name], but what He will make known unto the Twelve, and even the least Saint may know all things as fast as he is able to bear them, for the day must come when no man need say to his neighbor, Know ye the Lord; for all shall know Him […] from the least to the greatest."[42] Like Lehi, Joseph Smith spent his life sharing his visions in hopes that others might come to a knowledge of the truth—through revelation.

While Joseph's name may be mistaken in a title of an article dealing with Latter-day Saints, his role in the restoration definitely cannot be mistaken. Elder Neal A. Maxwell said, "Some may seek to explain Joseph merely by attaching to him the generous adjective *remarkable*. Joseph was remarkable, but, much more importantly, he was instrumental."[43] Joseph Smith was instrumental in bringing about the restoration of the Gospel of Jesus Christ. As such, he accomplished his mission by receiving visions—divine revelations—that enlarged his understanding and gave license to indulge in the fantastic. Thus, Joseph Smith (not John Smith) was an uncommon visionary; and because he was a visionary, we too can know as he knew and see as he saw. If one could ask Joseph Smith of his visionary status, I am confident he would respond much in the same manner as Lehi, "I know that I am a visionary man; for if I had not seen the things of God in a vision I should not have known the goodness of God."[44]

Matthew O. Richardson is an associate professor of Church history and doctrine and associate dean of the College of Religious Education at Brigham Young University in Provo, Utah.

REFERENCES

[1] Mysteries of Faith. *U.S. News and World Report*; 2003.

[2] Edwards A. Who was John Smith? not LDS Church founder. *Deseret Morning News.* November 8, 2003.

[3] *Doctrine & Covenants* 135:3.

[4] Smith LM. *History of Joseph Smith.*Nibley P, ed. Salt Lake City: Bookcraft; 1979:57.

[5] *Doctrine & Covenants* 122:1.

[6] 2 Nephi 3:9.

[7] 2 Nephi 3:14.

[8] Genesis 5:24. Joseph Smith Translation.

[9] Maxwell NA. Joseph, the Seer. In: *The Prophet and His Work*. Salt Lake City: Deseret Book; 1996:42.

[10] Young B. In: *Journal of Discourses*. Vol 7. London: Latter-day Saints' Book Depot; 1854-86:7:289. Hereafter cited as *JD*.

[11] Young, B. In: *JD:* 7:289-90.

[12] Pearsall J, Trumble B, eds. Visionary. In: *Oxford English Reference Dictionary*. Oxford: Oxford University Press; 2002.

[13] Seer. *An American Dictionary of the English Language.* New York: S. Converse; 1829.

[14] *Joseph Smith History* 1:24-25.

[15] 1 Nephi 5:4.

[16] Pratt O. In: *JD:* 14:262-263.

[17] 1 Nephi 2:11; 5:2.

[18] Porter L. A Study of the Origins of the Church of Jesus Christ of Latter-day Saints in the States of New York and Pennsylvania, 1816-1831 [dissertation]. Provo, Ut: Brigham Young University; 1971:360-364.

[19] Smith J. *History of the Church of Jesus Christ of Latter-day Saints*. Vol. 5. 2nd ed. Rev. Roberts BH, ed. Salt Lake City: Deseret Book; 1957:5:361-362

[20] Holland JR. Prophets, seers, and revelators. *Ensign.* November 2004:7.

[21] Pratt O. In: *JD:* 12:357.

[22] Allen JB. To the saints in England: impressions of a Mormon immigrant. *BYU Studies.* Spring 1978;18(3):478.

[23] Wells EB. *Young Woman's Journal.* 14:555-556.

[24] Smith J. *Teachings of the Prophet Joseph Smith.* Smith JF, comp. Salt Lake City: Deseret Book; 1976:191. Hereafter cited as *TPJS.*

[25] *Joseph Smith History* 1:12.

[26] Smith J. *TPJS:* 151.

[27] Smith J. *TPJS:* 149.

[28] Cannon GQ. In: *JD:* 23:362.

[29] Taylor J. In: *JD:* 17:374.

[30] Taylor J. In: *JD:* 21:94.

[31] Stevenson E. In: Madsen T. *Joseph Smith the Prophet.* Salt Lake City: Bookcraft; 1989:47.

[32] Smith J. *TPJS:* 342-362.

[33] John Taylor, In: *JD:* 10:148.

[34] Woodruff W. In: *JD:* 5:83-84.

[35] Young B. In: *JD*: 9:294.

[36] Isaiah 55:8-9.

[37] Smith J. *TPJS:* 356.

[38] Smith J. *History of the Church of Jesus Christ of Latter-day Saints*. Vol 5. 2nd ed. Rev. Roberts BH, ed. Salt Lake City: Deseret Book; 1957:5:139.

[39] Smith J. *TPJS:* 361.

[40] Anderson RL. Christian ethics in Joseph Smith biography. In: Black SE, ed. *Expressions of Faith.* Salt Lake City: Deseret Book; 1996:163.

[41] Smith J. *TPJS:* 324.

[42] Smith J. *TPJS:* 149.

[43] Maxwell NA. Joseph, the Seer. *Ensign.* November 1983:54.

[44] 1 Nephi 5:4.

When the Prophet Joseph wrote to Emma expressing that she was "the wife of my youth and the choice of my heart, he was not only ardently declaring his deep love for his sweetheart, but also expressing a fitting capstone to what I believe was the most remarkable love story in the history of the Church, made so by the equally remarkable circumstances in which their love began, grew, and flourished.

I stand convinced that Joseph could not have fulfilled his divine commission without the love, encouragement, and affection of the "choice of his heart." For him, that choice was Emma. Even a prophet needs a shoulder on which to rest his head, a sweetheart's tenderness, and the comfort of unqualified loyalty and love. From Emma, he received all of this.

What follows is not intended as a commentary on either Joseph or Emma. Neither is it a recounting of the history of their relationship. Rather, it is a commentary on love: the love which a man had for a woman. A love which survived and flourished in spite of all that

Joseph and Emma: a Love Story

by Elder Cree-L Kofford

being a prophet imposed upon it, a love which produced a story without equal in the annals of the Church in this dispensation. Even when businesses failed, friends deserted, apostasy ran rampant, the Church was shaking at its very foundation and even Joseph was driven to ask, "O God, where art thou? And where is the pavilion that covereth thy hiding place?" there was still Emma.[1] In Emma, Joseph found someone to share his love. She brightened his life and brought comfort to him as only a loving wife can do.

Even when businesses failed, friends deserted, apostasy ran rampant, the Church was shaking at its very foundation and even Joseph was driven to ask, "O God, where art thou? And where is the pavilion that covereth thy hiding place?" there was still Emma.

For those with definite opinions about Emma, let me clearly state that I am not about to define, defend, or persecute her. It is not my place to form judgment about her, nor do I need to. All I need to know is that Joseph loved her and needed her, and we needed Joseph. Whatever else there is to say about Emma can remain unsaid as far as I am concerned. He loved her; and from all I can tell, she returned that love with a passion equal to his own.

This remarkable love story had its beginning in two very different families. Emma was the seventh child, third daughter of the Isaac Hale family. That family lived in Harmony, Pennsylvania. They were prosperous farmers. My understanding is that for their time, they were considered to be among the more influential people in their community. At times, when farming did not require their full effort, they operated a boarding house. It was in that business venture that Emma and her sisters learned all that young women of that era should know.

She has been described as being talented, an excellent horsewoman and a great canoeist. She was an accomplished pianist and is said to have had a lyrical soprano voice. One writer described her as being "large and well proportioned, of splendid physique, dark complexion, with piercing eyes which seemingly looked one through; noble in appearance and bearing."[2] She had a tender spiritual attitude, a quick wit, and great native intelligence. She was a brilliant conversationalist and never used slang. For her time she was highly educated—for the first nine years of her life by her mother in the home, after which, when a community school was started, she continued her education in that school. Following that came finishing school.

My own judgment is that in the frontier period of the 1830s, I have just described what I would consider to be an accomplished, well-educated, well-bred and well-brought-up young woman. Events of her later years convince me that she was the apple of her father's eye, and I suspect her mother felt the same way. The nature of the Hale family would normally suggest that they, like most parents, had their share of dreams about the kind of young man they would like to see their daughter marry.

Sometime in her early twenties came young, uneducated, untutored Joseph and his father. They had come to dig for gold as employees of Josiah Stowell and took lodging with the Hales. Joseph's unschooled language must have been in sharp contrast to the proper grammar of Emma. It is doubtful from his social background that he had any real understanding at that time of the niceties of social conversation, or, for that matter, of social behavior. It would seem a fair bet that his father was probably no better, and perhaps even less polished than Joseph. I do not mean by any of these comments to suggest anything negative about their character, their personality, or their worth as human beings. I am simply commenting upon what—to Emma's mother and father—must have been a substantial lack of social grace and an obvious lack of education. We know that Emma's father did not like either Joseph or his father. He did not like their employer, and in those days, when the occupation of the son tended to follow that of the father, what you did for a living was another definition of who you were as an individual. Given that they had hired on to dig for buried riches by someone whom the Hales appeared to have considered to be of questionable character, it does not take much imagination to conclude what Emma's father and mother were feeling.

It must have been with some alarm that Mr. and Mrs. Hale watched as Emma became attracted to Joseph, and Joseph became enamored with Emma. They began to spend time together. Finally, Joseph was told by Mr. Hale that he would like him to leave. It seems to me that Joseph, like most young men of his age, was a little slow to catch the hint from Emma's father; nevertheless, Joseph

did remove himself from the home.[4]

Who was this girl with whom Joseph had fallen in love? As you try to understand Emma, I think you need to try and understand the age in which she lived. I want to make it clear that I find no need to recast Emma. It seems to me that there has been an abundance of effort to apologize for her, criticize her, or, in more recent years, remake her to fit into our present standard of acceptability. We have had some portraits in which, it seems to me, her appearance has been changed to meet modern standards of a beautiful woman. My feeling is we may have made some changes that are more fanciful than real.

To some she may appear to have started out as a spoiled favorite of an over-indulging father, but if that were ever true, it is certainly clear that by the time she reached maturity she had developed into a woman of strong character and strong will.

Lucy Mack Smith, one of the icons of the Church, said this about Emma:

> I have never seen a woman in my life who could endure every species of fatigue and hardship, from month to month, and from year to year, with that unflinching courage, zeal, and patience, which she has ever done; for I know that which she had to endure—she has been tossed upon the ocean of uncertainty—she has breasted the storms of persecution, and buffeted the rage of men and devils, which would have borne down almost any other woman.[5]

I do not know how many wives reading this article would have been content to have lived in someone else's house for all but a very short time during their married life. I rather suspect that every one of you would have wanted something to call your own home, and I feel equally certain that Emma would have shared your desires. The simple fact is that for most of her life, those desires were not fulfilled.

That kind of endurance required a woman of unusual character, and Emma was. Indeed, it would be fair, I think, to say that she was strong-willed. Looking several years into the future we find one illustration which gives us a small glimpse into this facet of her personality. While living in Nauvoo, Emma had left the city for one purpose or another. During her absence, as I understand the story, Porter Rockwell had been away in jail and had come home to Nauvoo expressing a desire to use one of the rooms in the house (where Joseph and Emma were living) for a particular business purpose. When she returned home, she saw the way things had been arranged and observed what Porter intended to do. Emma did not like that and sent word to Joseph that she wanted to see him. Joseph went to his wife and discussed removing Porter's proposed use from the home; he ultimately agreed to do so. As far as I know, it seems that Joseph was a little bit dilatory in advising Porter of the need to move. Emma took matters into her own hands, and in a not atypical, wifely fashion said to her husband something along the following lines: "[…] You are at liberty to make your choice; either [Porter's business] goes out of the house, or we will!" (The use of the word "we" referred to her children. She was ready to take them across the street to another house.) As far as I was able to learn, Joseph complied; Porter's business arrangement was removed.[6]

That is the kind of girl with whom Joseph fell in love. They got along well. Emma was teaching school and was about twenty-two years of age when she and Joseph went riding one morning and decided to elope. They rode directly to Squire Tarbill's and got married. It was January 18, 1827. Emma did not even go home to get her clothes according to at least one source.[3(p8)] She was later to say, "I had no intention of marrying when I left home; but [Joseph] … urged me to marry him, and preferring to marry him to any other man I knew, I consented."[7]

> Not many wives would have been content to have lived in someone else's house for all but a very short time during their married life. Everyone wants something to call their own home. But for most of Emma's life, those desires were not fulfilled.

To a woman, Emma's comments might sound somewhat strange. But, if you think about her, and put her comments in the context of the time and the place, she is easy to understand. The Lord was providing a wife, a sweetheart, a lover, and a friend for a prophet who was going to go through every kind of hardship you can imagine. Alongside Joseph every step of the way was Emma. Whatever else she was, she was, as far as I can tell, a faithful, devoted, loving companion to Joseph—not a shrinking violet, admittedly. She was a source of strength and courage. And that is as far as I

need to go in my understanding of her.

Well, Mr. Hale was dissatisfied and so was Mrs. Hale. The material which I have seen on the subject did not have a comment from Mrs. Hale. My guess is it was unprintable. Mr. Hale's was certainly civil, although very pointed. It is reported that he said to Joseph: "You have stolen my daughter and married her. I had much rather have followed her to her grave."[8]

Joseph and Emma had a rocky relationship with the Hales at the beginning and did not go back to the Hale home for some time. As most of you know, circumstances moderated somewhat, and they did move back into a house not far from the Hale home; there Joseph started work on the translation of the Bible, among other things.

They ultimately had nine children by natural birth; five of them died. They adopted two more; one of them died. Of the eleven, five lived. Now, you tell me what kind of woman it would take to endure that heartache. Without the strength of character possessed by Emma, including her free and independent spirit and her strong will, she would not have been able to bear up under such losses—especially when coupled with the withering pressure Joseph's life and calling required. Yet, their love prospered. There is nothing in the world known to me to suggest that they did anything but adore and care for each other. Emma stood not behind him, certainly not in front of him, but by his side. She had an opinion, and when she wanted to express it, she did. Sometimes she even waited for Joseph to ask. But, she was a woman of great character.

Emma stood not behind him, certainly not in front of him, but by his side. She had an opinion, and when she wanted to express it, she did. Sometimes she even waited for Joseph to ask. She was a woman of great character.

To convince you of the quality of their love, I would like to share with you some of the letters which were exchanged between Joseph and Emma. These are personal letters written between a man and a wife. Some of them are not ardent letters, perhaps, like some which most men write to their wives. I am sure these are not all of the letters there are. You will note the surprising lack of letters from Emma to Joseph. That fact might cause a few, at first blush, to conclude the love from Emma to Joseph of which I have spoken was in reality something less. I do not think so. When you stop to consider Joseph's circumstances, traveling under cover of darkness, often in hiding, being pursued by sheriffs and hounded by traitors, I rather suspect that Joseph's system for keeping letters left something to be desired. I prefer to think that Emma responded to Joseph every time that Joseph wrote, perhaps more often. And again, without proof of any kind, I would prefer to think that the absence of a letter was more a comment on the circumstances than on the love.

The first letter was written in New York City in 1832. Joseph and Newell Whitney had gone east to buy goods for the store. Having concluded his business for the day, he went back to his apartment and penned this letter:

> My Dear Wife,
>
> This day I have been walking through the most splended part of the City of […] New Y[ork] […] after beholding all that I had any desire to behold I returned to my room to meditate and calm my mind and behold the thaughts of home of Emma and Julia […] rushes upon my mind like a flood and I could wish for […] [a] moment to be with them [remember, Julia was the Murdock twin who lived] my breast is filld with all the feelings and tenderness of a parent and a Husband and could I be with you I would tell you many things [...] I feel for you for I know you[r] state and that others do not but you must cumfort yourself knowing that God is your friend in heaven and that you hav[e] one true and living friend on Earth your Husband [sic].[9]

The year now changes from 1832 to 1834. The Jackson County Saints had been driven from their homes; Zion's Camp had been formed, and the Prophet was marching with them. On June 4, 1834, as they arrived at the Mississippi River, Joseph again wrote to Emma:

> My Dear Companion,
>
> […] Every now and then our thoughts linger with inexpressible anxiety for our wives and our children our kindred according to the flesh who are entwined around our hearts [sic].[9(pp344-346)]

The year 1834 and those following came and went. The year 1838 found Joseph and Emma living at Far West. Governor Boggs had issued the extermination

order: "The Mormons must be treated as enemies and must be exterminated or driven from the state."[4(3:175)]

Three days later, an army of 2500 militia came to Far West for a final showdown. It was raining. Joseph was taken into custody and requested the opportunity to say goodbye to Emma and his children. He asked for a private audience. The guards refused. Then followed a scene which would tear any man's heart: His children clung to his leg. Joseph pled with the guards for a moment inside out of the rain to say goodbye to Emma and the children. Their refusal continued. He was about to be taken from them without even the opportunity to say goodbye. Of that moment, and speaking of his children, Joseph wrote these words which I find to be terribly beautiful and terribly romantic:

> They clung to my garments, their eyes streaming with tears, while mingled emotions of joy and sorrow were manifest in their countenances. I requested to have a private interview with them for a few minutes, but this privilege was denied me. I was then obliged to take my departure, but who can realize my feelings which I experienced at that time; to be torn from my companion, and leaving her surrounded with monsters in the shape of men. […] My children clung to me and were only thrust from me by the swords of the guard. […] I felt overwhelmed […] and could only recommend them to the care of that God, whose kindness had followed me [sic].[9(pp476-477)]

Thus ended that rain-drenched day in 1838 when a loving husband was forcibly taken from a loving wife.

The next day, Alexander Doniphan refused the order to put Joseph and others to death. The prisoners were taken toward Independence, Missouri. There, on November 4, 1838, Joseph wrote this letter:

> My dear and beloved companion, of my bosam, in tribulation, and affliction, I woud inform you that I am well, and […] that we are all of us in good spirits as regards our own fate […] I have great anxiety about you, and my lovely children […] do not forsake me nor the truth but remember me, if I do [not] meet you again in this life may God grant that we may […] meet in heaven, I cannot expresses my feelings, my heart if full, Farewell Oh my kind and affect onate Emma I am yours forever your Hu[s]band and true friend [sic].[9(pp399-401)]

The long, relentless persecution of Joseph continued. In Ray County, Missouri, waiting to learn if he would be required to stand trial, Joseph wrote again:

> My Dear Emma,
>
> […] Oh God grant that I may have the privaliege of seeing once more my lovely Family, in the injoymen , of the sweets of liberty, and [social] life, to press ther to my bosam and kiss […] their lovely cheeks woul fill my heart with unspeakable […] grattitude, tell the children that I am alive and trust I shall come and see them before long […] tell little Joseph, he must be a good boy, Father loves him [with] a perfect […] love. […] [And then he goes on to talk about Julia; she is a promising child. Then, to the love of his life, he says:] Oh my affectionate Emma, I want you to remember that I am [a] true and faithful friend, to you and the children, forever, my heart is intwined around you[r]s forever and ever, oh may God bless you all amen […] I am your husband and am in bands and tribulation &c- [sic].[9(pp405-406)]

"Who can realize my feelings which I experienced at that time; to be torn from my companion and children, and leaving them surrounded with monsters in the shape of men. I could only recommend them to the care of that God whose kindness had followed me."

Our next glimpse comes upon his arrival in Liberty Jail when he wrote this very short note: "My Dear companion I take this oppertunity to inform you that […] we arrived in Liberty […] my respects to all remain where you are at preasant" [sic].[9(p411)]

Joseph remained in Liberty Jail for what must have seemed like an eternity. In March 1839, Emma wrote to her husband and friend. (This is one of the few responses from Emma we have.)

> […] No one but God, knows the reflections of my mind and the feelings of my heart when I left […] allmost all of every thing that we possessed excepting our little children [sic].[10]

In response, Joseph, in March of 1839 wrote this understanding reply:

Affectionate Wife

[…] I want to be with you very much […] Dear Emma I very well know your toils and simpathise with you if God will spare my life once more to have the privelege of takeing care of you I will ease your care and indeavour to cumfort your heart [sic].[9(p448)]

The depressing dreary days in the hellhole of Liberty Jail con–tinued. Joseph wrote what, to me, is the most tender and beautiful love letter he ever penned:

"Dear–and affectionate–wife.

Thursday night I set down just as the sun is going down, as we peak throw the greats of this lonesome prision, to write to you, that I may make known to you my situation. […] My Dear Emma I think of you and the children continually. […] I want [to] see little Frederick, Joseph, Julia, and Alexander, Joana, and old major [that was his dog]. And as to yourself if you want to know how much I want to see you, examine your feelings, how much you want to see me […] I would gladly [walk] from here to you barefoot, and bareheaded, and half naked, to see you and think it a great pleasure, and never count it toil, but do not think that I am baby-ish, for I do not feel so [...] I want you [should] not let those little fellows, forgit me, tell them Father loves them […] tell them Father says they must be good children [and] mind their mother, My Dear Emma there is great respo[n]sibility resting upon you, in preserveing yourself in honor, and sobriety, before them […] I find no fault with you, […] I know nothing but what you have done the best you could. […] Do not [be] self willed, neither har-ber a spirit of revenge: and again remember that he who is my enemy[…], is yours also, and never give up an old tried friend, who has waded through all manner of toil, for your sake, and throw him away becau[se] fools may tell [you] he [has] some faults; […] I want to stir up your pure mind by way of remembrance [sic]."[9(pp463-465)]

"With what unspeakable delight, and what trans-ports of joy swelled my bosom, when I took by the hand on that night, my beloved Emma, she that was my wife, even the wife of my youth; and the choice of my heart... Again she is here, even in the seventh trouble, undaunted, firm and unwavering, unchange-able, affectionate Emma."

At long last, the ordeal of Liberty Jail was behind them. Joseph has gone east seeking redress for the wrongs unrightfully inflicted. He there wrote the following:

[…] my dear Emma my heart is intwined arround you and those little ones I want [you] to remem-ber me tell all the chi[l]dren […] that I love them and will come home as soon as I can yours in the bonds of love your Husband u[n]til Death &c [sic].[9(p490)]

Failing in his efforts to seek re-dress, Joseph returned home apparently unaware that a marshal was trying to arrest him and Porter Rockwell on the charge of having tried to assassinate Governor Boggs. Through a series of circum-stances, Joseph was able to go into hiding and avoid the sheriff. While in hiding, he wrote:

My Dear Emma,

I embrace this opportunity to express to you some of my feel-ings this morning. First of all, I take the liberty to tender you my sincere thanks for the two inter-esting and consoling visits that you have made me during my almost exiled situation. Tongue cannot express the gratitude of my heart, for the warm and true-hearted friendship you have manifested in these things toward me. […] I think if I could have a respite of about six months with my family, it would be a savor of life unto life, with my house.[9(pp554-555)]

If you want to know a little more about Emma's character, at one point in this ordeal, Joseph went into hiding on an island in the middle of the Mississippi River. Emma, under cover of darkness, forded the river and met him on the island. Joseph wrote from the depths of his soul about that meeting:

With what unspeakable delight, and what transports of joy swelled my bosom, when I took by the hand on that night, my beloved Emma, she that was my wife, even the wife of my youth; and the choice of my heart. Many were the reviberations of my mind when I contemplated for a moment the many […] scenes we had been called to pass through. The fatigues, and the toils, the sorrows, and sufferings, and the joys and consolations from time to time [which] had strewed our paths and crowned our

> board. Oh! what a co-mingling of thought filled my mind for the moment, again she is here, even in the seventh trouble, undaunted, firm and unwavering, unchangeable, affectionate Emma. [sic].[9(p560)]

Over the lifetime of letters, Joseph poured out his heart to the woman he loved, and she returned that love. But there is more to this great love story. As their love grew and matured, Joseph and Emma were ultimately privileged to participate in the sealing ordinance. One available source records that on May 28, 1843, they were sealed in the upstairs room of the Mansion House. The love which began in their youth now reached fulfillment in the sacredness in this ordinance.[3(p16)]

Some of us see in Emma a great heroine; others of us see in Emma other things. I see in Emma a woman whom Joseph loved. Joseph could not have done what he had to do had Emaa not been at his side.

As they drew to the end of Joseph's life, their love continued. Perhaps it was the comforting assurance of eternal love born of the sealing that allowed Joseph to write with such equanimity one final letter to the choice of his heart. At 8:20 a.m. on the morning of his martyrdom, he wrote this postscript to a letter:

> PS Dear Emma,
>
> I am very much resigned to my lot knowing I am Justified and have done the best that could be done give my love to the children […] may God […] bless you all [sic].[9(p630)]

Poetically, at 5:00 p.m., Joseph's life was taken by men who had conspired to commit murder. According to Joseph Smith III, Emma, upon learning of Joseph's death, cried out: "Oh, Joseph, Joseph! My husband, my husband! Have they taken you from me at last?" In a very human effort to honor her love, she placed a lock of his hair in a locket and wore it from that time until her death.[11]

As she lay on her deathbed on April 30, 1879, her son Alexander wrote that Emma suddenly rose up in the bed and said, "Joseph, Joseph!" Joseph Smith III wrote that his mother turned her face and gazed upward. Her last words were: "Yes, yes! I am coming!" Then she quietly passed away. Emma's body was laid to rest near her sweetheart, Joseph.[12]

That is a love story of two great lovers. I offer to you not a comment upon the character of either, but upon the relationship of the man for a woman whom he loved. We often think of the Prophet Joseph as a great leader, a great spiritualist, a great restorer, but not often do we think of him as a great romantic husband, lover, and friend. Some of us see in Emma a great heroine; others of us see in Emma other things. I see in Emma a woman whom Joseph loved.

It is my personal belief that Joseph could not have done what he had to do had Emma not been at his side. Irrespective of what her strengths and weaknesses may have been, for him, she was the wife of his youth, the choice of his heart, and the meaning of his life. She was there as his friend when others turned against him, even some who served with him in the First Presidency and the Quorum of the Twelve. Emma was there. Even when she expressed her opinion in opposition to Joseph, her loyalty was there. She was there and, to him, will always be just what Joseph said: "the wife of my youth and the choice of my heart."

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REFERENCES

[1] Doctrine and Covenants 121:1.

[2] Wells, EB. "LDS women of the past: Personal impressions." *Woman's Exponent*. February 1908;36:1.

[3] Peterson J, Gaunt L. "Elect Ladies." Salt Lake City, UT: Deseret Book; 1990:6.

[4] Roberts BH, ed. "History of the Church of Jesus Christ of Latter-day Saints." 2nd ed. rev. Salt Lake City, UT: The Church of Jesus Christ of Latter-day Saints; 1991; 1:17.

[5] Nibley P, ed. "History of Joseph Smith by His Mother." Salt Lake City, UT: Bookcraft; 1958:190-191.

[6] Anderson MAS, ed. "The memoirs of President Joseph Smith." *The Saints' Herald*. 22 January 1935;82: 110.

[7] Black SE. "Who's Who in the Doctrine and Covenants." Salt Lake City, UT: Bookcraft; 1997:273.

[8] Evans JH. "Joseph Smith, an American Prophet." Salt Lake City, UT: Deseret Book; 1989:37-38.

[9] Jessee DC, comp. and ed. "The Personal Writings of Joseph Smith." 2nd ed. Salt Lake City, UT: Deseret Book; 2002:278-279.

[10] Jessee DC, comp. and ed. "The Personal Writings of Joseph Smith." Salt Lake City, UT: Deseret Book; 1984:388.

[11] Black SE. "Emma Hale Smith: an elect lady." *Church News of the Church of Jesus Christ of Latter-day Saints*. 4 January 1997:14.

[12] Anderson MA, ed. "Joseph Smith III and the Restoration." Independence, MO: Herald House; 1952:283.

Is an Avian Influenza Pandemic *Inevitable?*

by John M. Matsen, M.D.
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The word **pandemic** should arouse interest—it should arouse disquiet, fear and action. It should arouse preparedness—especially from a church whose membership sends thousands of its young adults, adults and elderly to far-reaching tracts of the globe. This word should catalyze special interest when coupled with the definitive qualifier "inevitable."

Experts across the globe are coupling these two terms in hope of urging an appropriate and immediate worldwide reaction. Ned Stafford of the *The Lancet* reported:

> Klaus Stöhr, head of WHO's global influenza programme […] believes it's not a question of "if" a global influenza pandemic hits, but of when. "This is my job, the reason I am working: to reduce the number of people who die from influenza, who suffer from it," he says, his English perfect, with only a hint of German. The average span between global influenza pandemics is 27 years, he says. The last one struck nearly 37 years ago in 1968. He warns that the next pandemic could be exacerbated by the deadly H5N1 strain of avian flu, which has caused dozens of human deaths in the past year in southeast Asia. Stöhr estimates more than a billion people could fall ill in a pandemic, with 2-7 million deaths.[1]

Hopefully, Stöhr's work will not go unnoticed. Those of us who are concerned with the world's healthcare situation must make sure it does not.

Definition

The term "pandemic" means a vastly larger number, or a vastly larger scale than just an epidemic. An epidemic connotes that areas, states, regions are affected by a certain issue. The scale a "pandemic" suggests is profound—50% of the world could be infected with Avian Influenza. Stöhr's numbers of 2-7 million could potentially soar to 50-60 million deaths or more. A pandemic, by nature, can overwhelm available healthcare resources.

Historical Impact on Humans

The CDC explains that during the 20th century, the emergence of new influenza A virus subtypes caused three pandemics, all of which spread around the world within one year of being detected:

- 1918-19, "Spanish flu," [A (H1N1)] caused the highest number of known influenza deaths—more than 500,000 people died in the United States, and up to 50 million people may have died worldwide. Many people died within the first few days after infection, and others died of complications later. Nearly half of those who died were young, healthy adults. Influenza A (H1N1) viruses still circulate today after being introduced again into the human population in the 1970s.
- 1957-58, "Asian flu," [A (H2N2)] caused about 70,000 deaths in the United States. First identified in China in late February 1957, the Asian flu spread to the United States by June 1957.
- 1968-69, "Hong Kong flu," [A (H3N2)] caused about 34,000 deaths in the United States. This virus was first detected in Hong Kong in early 1968 and spread to the United States later that year. Influenza A (H3N2) viruses still circulate today.

Both the 1957-58 and 1968-69 pandemics were caused by viruses containing a combination of genes from a human influenza virus and an avian influenza virus. The origin of the 1918-19 pandemic virus is not clear.[2]

History will repeat itself; conditions now exist for the genesis of the next pandemic.

In that context, *The Washington Post* reports, "international health experts warn that conditions are set for a bird flu pandemic that could kill millions worldwide if the virus developed into a form capable of spreading among humans."[3] Bird flu/avian flu will most likely mutate into a human-to-human transmittable strain soon. In fact, at least one source asserts this mutation has already occurred. The *New England Journal of Medicine* printed an article by Ungchusak et al entitled "Probable Person-to-Person Transmission of Avian Influenza A (H5N1)" in January this year.[4] Other scientists suspect there have been more human-to-human transmissions than we can document. This Avian Influenza spread among humans will not likely mirror the typical target groups seen in yearly influenza epidemics. Interestingly, whereas the very young and very old in other types of illnesses seem to be the ones that are hit, the Avian Influenza pandemic viruses seem to have a predilection to hit young adults.[5]

Much of a recent issue of *Nature* focuses on the dangers of and current status and thinking of the avian influenza and the potential/inevitable pandemic:

> This issue's focus on avian flu highlights progress and incoherence in the world's response to a potential human pandemic. But the threat is enormous, and some priorities are clear enough. Millions of people killed in highly developed countries within months. Tens of millions worldwide. The global economy in tatters. A Hollywood fantasy? No—it's now a plausible scenario. The first act, the spread of avian flu to, and probably between, humans, has already started across Asia. Unless the international community now moves decisively to mitigate this pandemic threat, we will in all probability pay heavily within a few years. Then, hard questions will be asked as to why we were not prepared.[6]

Skeptics abound, convinced that talk of a pandemic must be scare-mongering, or scientists crying wolf. Surely with support care, drugs and vaccines, at least the more affluent areas of the world can easily stand up to a flu virus? After all, this is 2005, not 1918, when a flu pandemic killed up to 50 million people worldwide. But, while the science and medicine of flu have advanced substantially, our ability to mount an effective public-health response has made remarkably little progress over the decades, and the potential for panic is, if anything, greater given the impact of television and the Internet.

This range of possible effect needs to be put in perspective in context of the number of humans in the world now—a pandemic could be much more of a profound issue than it has ever been in the past.

Key aspects of the virus are as follows:

- Avian influenza is a viral disease that commonly infects birds around the world.
- Signs of the disease are highly variable.
- In some birds/flocks (especially wild ducks), the only evidence of the infection is seroconversion,

i.e., the birds develop a detectable antibody titer to the avian influenza virus.

- "All birds are thought to be susceptible to infection with avian influenza, though some species are more resistant to infection than others. Infection causes a wide spectrum of symptoms in birds, ranging from mild illness to a highly contagious and rapidly fatal disease resulting in severe epidemics. The latter is known as 'highly pathogenic avian influenza.'"[7]
- "Fifteen subtypes of influenza virus are known to infect birds. To date, all outbreaks of the highly pathogenic form have been caused by influenza A viruses of subtypes H5 and H7."[6]
- "Migratory waterfowl—most notably wild ducks—are the natural reservoir of avian influenza viruses, and these birds are also the most resistant to infection. Domestic poultry, including chickens and turkeys, are particularly susceptible to epidemics of rapidly fatal influenza."[6]

Wild birds, therefore, are incredibly critical to the pandemic's spread and virulence.

After mentioning the above, we should emphasize that most Avian Influenza strains are of low pathogenicity (i.e., less able to cause disease) and typically cause few or no clinical signs in infected birds. This does not, however, mean that all strains are of low pathogenicity—and we know that low pathogenic strains can reassort to become highly pathogenic.

Current Pathotypes

There are two current pathotypes of Avian Influenza virus. The most common is low pathogenic AI (LPAI), which is found in a few poultry flocks in the United States and elsewhere every year, usually spread from wild birds. In 1964, influenza viruses of low to moderate pathogenicity were first detected in poultry in the US. They have been detected somewhere in poultry in the United States every year since 1964—a time span of 40 years.[8]

The other is the highly pathogenic AI (HPAI), which is much less common and is associated with higher mortality in poultry. HPAI was once called fowl plague. The WHO Fact Sheet states that "Highly pathogenic avian influenza (fowl plague) was first documented in Italy more than 100 years ago.[9]

At the 1981 International Symposium on avian influenza, the term HPAI was replaced with the term "highly virulent" influenza. "The AI epidemic of 1983-1984 required yet new terms to describe relative pathogenicity of different isolates of the same serotype (nonpathogenic, low-pathogenic, highly pathogenic)."[7]

One key to understanding the danger of an influenza pandemic is that Avian flu viruses of low pathogenicity (LPAI) can, after circulation for just short periods of time in a poultry population, mutate into HPAI. WHO asserts:

> During a 1983–1984 epidemic in the United States of America, the H5N2 virus initially caused low mortality, but within six months became highly pathogenic, with a mortality approaching 90%. Control of the outbreak required destruction of more than 17 million birds at a cost of nearly US $65 million. During a 1999–2001 epidemic in Italy, the H7N1 virus, initially of low pathogenicity, mutated within 9 months to a highly pathogenic form. More than 13 million birds died or were destroyed.[8]

This virus behavior in animals is not completely understood, nor is its potential propensity for this happening in other animal genera.

The CDC, in a publication addressing the "Transmission of Influenza A Viruses Between Animals and People" explains:

> Influenza A viruses are found in many different animals, including ducks, chickens, pigs, whales, horses, and seals. However, certain subtypes of influenza A virus are specific to certain species, except for birds which are hosts to all subtypes of influenza A. Subtypes that have caused widespread illness in people either in the past or the current period are H3N2, H2N2, H1N1, and H1N2. H1N1 and H3N2 subtypes have caused outbreaks in pigs and H7N7 and H3N8 viruses have caused outbreaks in horses.
>
> Influenza A viruses normally seen in one species sometimes can cross over and cause illness in another species. For example, up until 1998, only H1N1 viruses circulated widely in the US pig population. However, in 1998, H3N2 viruses from humans were introduced into the pig population and caused widespread disease among pigs.
>
> Avian influenza viruses may be transmitted to humans in two main ways:
>
> - Directly from birds or from avian virus-contaminated environments to people.
> - Through an intermediate host, such as a pig.[10]

Swine are a particular concern because they are human-like and mammals. WHO explains:

> Conditions favourable for the emergence of antigenic shift have long been thought to involve humans living in close proximity to domestic poultry and pigs. Because

> pigs are susceptible to infection with both avian and mammalian viruses, including human strains, they can serve as a "mixing vessel" for the scrambling of genetic material from human and avian viruses, resulting in the emergence of a novel subtype. Recent events, however, have identified a second possible mechanism. Evidence is mounting that, for at least some of the 15 avian influenza virus subtypes circulating in bird populations, humans themselves can serve as the 'mixing vessel.'

In other words, the re-assortment of the virus in pigs is alarming—especially when that re-assortment moves to human petri dishes.

This alarm is not just confined to medical journals. The threat of a pandemic is catalyzing a burst of publication in every sort of periodical. Washington Post writer Alan Sipress elaborates on the problem of pig "mixing vessels" for the assortment and altered pathogenicity of the virus. He writes, that since the "Asian swine population has also increased significantly[,] it could be the gathering of a perfect storm: dense concentrations of chickens, pigs, aquatic birds and people." He quotes Michael Osterholm, director of the Center for Infectious Disease Research and Policy at the University of Minnesota: "It's clear that Southeast Asia poses the greatest risk today of a new virus unfolding and coming forward as a pandemic strain. Darwin could not have created a more efficient re-assortment laboratory if he tried."[3]

A *Nature* editorial summarizes the WHO's stance on this possible mutation:

> WHO believes the appearance of H5N1, which is now widely entrenched in Asia, signals that the world has moved closer to the next pandemic. While it is impossible to accurately forecast the magnitude of the next pandemic, we do know that much of the world is unprepared for a pandemic of any size. H5N1 is dangerous, not just because it is one of the two highly pathogenic forms of Bird Flu; it is also highly prone to re-assortment.[6]

There is, therefore, more reason to pay attention to H5N1 than just that a pandemic is overdue. The H5N1 strain has been reported in at least 8 Asian countries, and governments throughout that region have now slaughtered the enormous number of over 200 million chickens, ducks, and other poultry in an effort to keep the H5N1 virus from spreading. Yet, as one article explains: "The mass culling […] did not stop the virus."[3] The Minnesota Department of Health & and the US Department of Agriculture have both reported: "Farm equipment and shoes can be important in the transmission between flocks & farms. Handling dead poultry and even walking through live poultry markets are potential forms of exposure." As if that weren't evidence enough of the frightening possibilities of contamination, it's been reported that: "One gram of contaminated manure can contain enough virus to infect 1 million birds."[7] Obviously, the range of such infection is immeasurable.

Cases studied by de Jong et al suggest "the clinical spectrum of influenza H5N1 is wider than previously thought, and, therefore, they have important implications for the clinical and public health responses to avian influenza." They assert, "These reports suggest that avian influenza A (H5N1) virus is progressively adapting to mammals and becoming more neurologically virulent."[11] The USDA elaborates on this concern, "Of great concern to WHO and the world medical community is the possibility that the present situation, if the avian influenza virus acquires human influenza genes, can give rise to human–to–human transmission and possibly another disastrous influenza pandemic in people."[12] As noted earlier,[4] only one case (in the last year) of human-human spread is reported and documented. However, a number of investigators suspect other cases have occurred. The other documented cases of human Avian Influenza were poultry/bird-to-human transmission.

Michael T. Osterholm, in *The New England Journal of Medicine*, elaborates on other dangers of the H5N1 virus. He asserts:

> Should H5N1 become the next pandemic strain, the resultant morbidity and mortality could rival those of 1918, when more than half the deaths occurred among largely healthy people between 18 and 40 years of age and were caused by a virus-induced cytokine storm that led to the acute respiratory distress syndrome (ARDS). The ARDS-related morbidity and morality in the pandemic of 1918 was on a different scale from those of 1957 and 1968—a fact that highlights the importance of the virulence of the virus subtype or genotype. Clinical, epidemiologic, and laboratory evidence suggests that a pandemic caused by the current H5N1 strain would be more likely to mimic the 1918 pandemic than those that occurred more recently. If we translate the rate of death associated with the 1918 influenzavirus to that in the current population, there could be 1.7 million deaths in the United States and 180 million to 360 million deaths globally. We have an extremely limited armamentarium with which to handle millions of cases of ARDS—one not much different from that available to the front-line medical corps in 1918. [sic] [13]

In the context of clinical manifestations of the Acute Respiratory Distress Syndrome, the virulence of the virus in 1918-19 was on a different scale than previously recognized or subsequently seen. Because of this difference, researchers have seemingly been more interested in defining this virulence difference.

For example, by recreating the influenza virus that killed 50 or more million people in 1918-19, Kobasa et al may have identified the gene that turned it into one of the most lethal in human history. The gene, one of eight in the virus, seems to have an unexpected capacity for sending the body's immune system into overdrive, causing inflammation, hemorrhagic pneumonia and death.[14]

Using reverse genetics, they synthesized the hemagglutin antigen and the neuraminidase genes based on the genetic sequences of the 1918-1919 influenza pandemic strain, and in recreating the virus, they have shown that the resulting virus is significantly more virulent than the wild-type strain in a mouse model.[14,15]

Vaccination Status

Because the avian influenza virus can kill the embryonated eggs used in the current vaccine process, this same reverse genetics process appears to be a key option in the production of a vaccine against the avian influenza. Research is vigorously being pursued, as illustrated in the following excerpt:

> A promising approach to reduce the impact of influenza is the use of an attenuated, live virus as a vaccine. Using reverse genetics, we generated a mutant of strain A/WSN/33 with a modified cleavage site within its hemagglutinin, which depends on proteolytic activation by elastase. Unlike the wild-type, which requires trypsin, this mutant is strictly dependent on elastase. Both viruses grow equally well in cell culture. In contrast to the lethal wild-type virus, the mutant is entirely attenuated in mice. At a dose of 105 plaque-forming units, it induced complete protection against lethal challenge. This approach allows the conversion of any epidemic strain into a genetically homologous attenuated virus.[16]

In other words, progress is ongoing.

WHO has taken the lead in surveillance to characterize the H5N1 influenza virus. Their on-going scrutiny will define avenues for further understanding of virus/vaccine options.

The WHO Influenza Surveillance Network has characterized H5N1 influenza viruses isolated from humans and animals from several countries affected by the 2004/2005 H5N1 outbreak in Asia. WHO has also made recommendations on the antigenic and genetic characteristics of H5N1 viruses which are suitable for vaccine production.

In addition, WHO collaborating centres and reference laboratories have developed several recombinant H5N1 prototype vaccine strains, including A/Vietnam/1194/04, A/Vietnam/1203/04 and A/Hongkong/213/03, according to the requirements of several major national and international pharmaceutical licensing agencies for influenza vaccine production. These H5N1 influenza pandemic vaccine prototype strains have already been made available to a number of institutions and companies, and several different vaccines have been produced for clinical testing.

It is understood that there are no intellectual property issues restricting the use of reverse genetics for pandemic vaccine research. However, it is anticipated that licences must be negotiated before commercial use of such vaccines. Since there is no nonpathogenic surrogate avian influenza H5N1 strain, researchers have innovated to use the HP H5N1 virus and have modified its genome to attenuate virulence. They next rescued a candidate vaccine virus entirely from cloned DNA using cells that are approved for producing vaccines. In a matter of months, two independently derived vaccine candidates were prepared, in the U.S. and the U.K.[17]

It is pertinent to understand that what is happening now is exploratory. When we know the antigenic makeup of the pandemic strain, *Nature* explains, "At least four months would be needed to produce a new vaccine, in significant quantities, capable of conferring protection against a new virus subtype."[6] In reference to the potential danger of the inevitable pandemic, Sipress, of the *Washington Post*, reports that, "Tommy G. Thompson, former U.S. Secretary of Health and Human Services, told reporters at his farewell news conference in December [2004] that avian flu was his greatest health fear. He called it a 'really huge bomb' that concerned him even more than bioterrorism."[3]

Containment is Urgently Required

As previously stressed in this discussion, "The potential exists for genetic reassortment with human influenza viruses and the evolution of human-to-human transmission. Containment of influenza A (H5N1) in poultry throughout Asia is, therefore, urgently required."[18] The fact that H5N1 exists in the numbers it does in southeast Asia means that it will likely be present there for a number of years to come.

Worldwide Preparedness

The editor-in-chief of *U.S. News & World Report*, in an editorial entitled "A Nightmare Scenario," makes the seminal statement: "The havoc that would be wrought by an avian-flu pandemic is so awful that we must act now to be able to prevent such a disaster."[19]

Likewise, "Give[n] the current threat, WHO has urged all countries to develop or update their influenza pandemic preparedness plans for responding to the widespread socioeconomic disruptions that would result from having large numbers of people unwell or dying."[20] If countries do not act on this urgent request, the death toll will soar.

Because of the AI strains' ability to adapt, mutate and genetically reconfigure, there is no way to predict which

antigenic type or substrain of the virus will be the one to catalyze and precipitate the pandemic. There is also no guarantee that the causal strains will behave as past documented cases (influencing young, healthy adults, etc.). Likewise, the threat is significantly increased when worldwide travel and global economies are taken into account. If the pandemic occurs before adequate preparations are made, the world population is in serious trouble, both biologically and socioeconomically.

If a pandemic appears, the WHO has explained:

- Given the high level of global traffic, the pandemic virus may spread rapidly, leaving little or no time to prepare.
- Vaccines, antiviral agents and antibiotics to treat secondary infections will be in short supply and will be unequally distributed. It will take several months before any vaccine becomes available.
- Medical facilities will be overwhelmed.
- Widespread illness may result in sudden and potentially significant shortages of personnel to provide essential community services.
- The effect of influenza on individual communities will be relatively prolonged when compared to other natural disasters, as it is expected that outbreaks will reoccur.[21]

Conclusion

One of the salutary effects of recent international disasters is an increased world-wide attitude of collaboration. This cooperation is a result of the global implications or impact of SARS, H5N1 Avian Influenza, the South-East Asia Tsunami, and the Marburg-Ebola challenge, etc. The world-wide capability of WHO has been raised to a new plateau; the cooperation between WHO and other national centers has elevated to a new level of interaction. At one time, the US Centers for Disease Control and Prevention was clearly the premier reference resource. It is still a vital resource, but other nations and the WHO have increased their capability to deal with natural and infectious calamities. Another key feature of cooperation is the recently agreed-upon set of World Health Assembly regulations for "managing public health emergencies of international concern."[22]

A comment made by Hans Troedsson and Anton Rychener, in their article "When Influenza Takes Flight" published in the New York Times is as articulate as it is profound. "The governments concerned and the international community need to act now to find solutions to the challenges posed by these outbreaks. The threat of an influenza pandemic transcends the capacities of any individual nation or region. For the tsunami, the world had no warning. For avian influenza, the warning is there."[23]

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REFERENCES

[1] Stafford N. Profile: Klaus Stöhr: preparing for the next influenza pandemic. *Lancet.* January 29, 2005;365:379.

[2] CDC. Information about influenza pandemics. Available at: http://www.cdc.gov/flu/avian/gen-info/pandemics.htm. Accessed May 25, 2005.

[3] Sipress A. WP foreign service. As SE Asian farms boom, stage set for a pandemic: conditions ripe for spread of bird flu. *Washington Post.* February 5, 2005.

[4] See Ungchusak, et al. Probable person-to-person transmission of avian influenza A (H5N1). *NEJM.* January 27, 2005;352(4):333-340.

[5] Stöhr K. Avian influenza and pandemics—research needs and opportunities. *NEJM.* January 27, 2005;352(4):405-407.

[6] Editorial. On a wing and a prayer. *Nature.* May 26, 2005;435(7041):385-386.

[7] WHO. Avian Influenza—fact sheet. January 15, 2004. Available at: www.who.int/mediacentre/factsheets/avian_influenza/en/print.html. Accessed February 15, 2005.

[8] University of Minnesota. Avian influenza overview. March 11, 2005. Available at: http://128.101.246.19/outreach/AI/. Accessed April 4, 2005.

[9] WHO. Avian Influenza-fact sheet. January 15, 2004. Available at: http://www.who.int/csr/don/2004_01_15/en/print.html. Accessed June 3, 2005.

[10] CDC. Transmission of influenza A viruses between animals and people. Available at: http://www.cdc.gov/flu/avian/gen-info/transmission.htm. Accessed June 3, 2005.

[11] de Jong, MD, et al. Fatal avian influenza A (H5N1) in a child presenting with diarrhea followed by coma. *NEJM.* February 17, 2005;352(7):686-691.

[12] USDA—Veterinary Services. Highly pathogenic avian influenza, a threat to US poultry. March 2004. Available at: http://www.aphis.usda.gov/lpa/pubs/fsheet_faq_notice/fs_ahavianflu.html.

[13] Osterholm MT. Preparing for the next pandemic. *NEJM.* May 5, 2005;352(18):1839-1842.

[14] Kobasa D, et al. Critical gene a suspect in lethal 1918-1919 epidemic. *Nature.* October 7, 2004;431:703-707.

[15] Hoft DF, Belshe RB. The genetic archaeology of influenza. *NEJM.* December 9, 2004;351(24):

[16] Stech J, et al. A new approach to an influenza live vaccine: modification of the cleavage site of hemagglutinin. *Nature Medicine.* June 2005;11(6):683-689.

[17] WHO. Availability of H5N1 prototype strains for influenza pandemic vaccine development. February 2005. Available at: http://www.who.int/csr/disease/avian_influenza/guidelines/avian_influenza_prototype_strains/en/print.html.

[18] Tinh Hien T, et al. The World Heath Organization International Avian Influenza Investigative Team. Avian influenza A (H5N1) in 10 Patients in Vietnam. *NEJM.* March 18, 2004;350(12):1179-1188.

[19] Zuckerman, MB. A Nightmare Scenario. *U.S. News & World Report.* June 27, 2005;138(24):64.

[20] WHO. Estimating the impact of the next influenza pandemic: enhancing preparedness. Geneva: WHO;December 8, 2004.

[21] WHO. Influenza pandemic. June 22, 2005. Available at: www.who.int/csr/disease/influenza/pandemic/en/index.html. Pandemic Preparedness. Accessed June 22, 2005.

[22] Ress P. Heath assembly adopts new regulations for tackling emergencies. *BMJ.* May 28, 2005;330(7502):1230.

[23] Troedsson H, Rychener A. When influenza takes flight. *New York Times.* February 5, 2005.


BIOHAZARD

Under the Cloud of Terrorism: Smallpox and Considerations for Vaccination

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Abstract

The events of September 11, 2001, have resulted in the ominous threat of bioterrorist attack. In surveying possible agents to which the United States could become vulnerable, smallpox rises to, or near, the top of such a list. Smallpox becomes an even more viable threat when history teaches us that it has been used periodically over the ages to devastate certain enemies and has been credited with abetting the downfall of empires. Smallpox can prove to be a very effective weapon because of ease of transport and transmission with ensuing devastation, especially due to the lack of treatment options. Adding to this threat is the manner in which smallpox manifests itself. Prodromal symptoms are virtually indistinguishable from the flu and, unless a patient or physician is skillfully trained in detection, the appearance of the rash can be easily mistaken for chickenpox—a disease commonly encountered in childhood. Since smallpox has not been reported in this country in a half-century, the vast majority of physicians have no experience in either diagnosing or treating this devastating disease. With a bioterrorist threat looming over us, it is imperative that doctors familiarize themselves with this disease and with how to quickly and efficiently differentiate smallpox from chickenpox (and even the flu) for early detection and containment. This paper reviews these issues and provides a list of internet-based training web sites to assist healthcare professionals in updating their expertise. This simple step can prove most valuable in increasing public confidence of our healthcare givers—thereby making us much less vulnerable to attack.

Introduction

In a world where bioterrorism is deemed an imminent threat, it becomes imperative that physicians are aware of the dangers posed by misdiagnosis in initial cases. Bioterrorism can encompass a variety of forms, e.g., poisons, bacteria, or viruses that can be specifically formulated for introduction into the environment. Most are aware of the potential for bioterrorism, but few lay people would understand how easily the situation could escalate if the health-care practitioners were not well versed in differentiating between normal childhood illnesses like chickenpox and a bioterrorist attack using an agent such as smallpox. Present-day physicians have had little or no dealings with such diseases in the age of vaccinations; therefore, the danger of misdiagnosis is very real.

The emergence of detrimental biological agents exists in today's political climate, but safety, economic, and logistical issues create barriers that serve to reduce the probability of occurrence. From a historical perspective, bioterrorism is more than a possibility.[1,2] Bioagents have been used before, suggesting that mankind is not only willing but capable of using these types of weapons whenever feasible. Confounding variables toward determining whether an actual attack is occurring are: (1) the fact that spontaneous eruptions of the disease can arise because it is found in nature and (2) the possibility of emerging agents capable of mimicking epidemic diseases.[3]

In an excessively mobile and technologically advanced world, the threat of an attack is not isolated to any single country. Together, these two avenues can act in concert to promote bioterrorism in any country in the world or in several countries simultaneously. The United States is particularly vulnerable because of its lengthy borders that span the width of the nation on both the north and south. Approximately six thousand miles of border, most of which can remain unguarded for excessive periods of time, pose an open invitation to anyone to bring harmful agents into the United States and, once inside the country, to freely move about to locate possible targets.

Contrary to the ease of entry into the United States, several factors serve to negatively impact possible acts of bioterrorism.[4] Since September 11, 2001, US security operations have been reorganized and heightened in order to provide better protection. Additionally, the formulation and transport of such agents capable of mass casualties is also a difficult undertaking; for instance, in order to contaminate a water supply, the terrorist would have to first formulate the bioagent for maximum dispersal and solution, then transport huge amounts of the agent. The amount needed to perform this task would to be too large to hide or transport easily. These water resources contain such large volumes of water, it would be virtually impossible to produce a water-borne agent capable of causing a high level of morbidity or mortality.

Aerosolized agents (which can be released from the air) would provide a more practical solution to the introduction of harmful agents as far as the logistics of transportation are concerned, but due to the efforts to increase airport security and public awareness, its likelihood is diminished.[5]

Historical Perspectives

Bioterrorism

The concept of using biological agents as weapons of war, manipulation and dominance is not new. Such practices occurred on American soil in the 1700s. The British were determined to eradicate the native Indians and, therefore, used smallpox-infected blankets for trade with the natives. This act proved for more effective than the British expected because the Indians had never been exposed to this pathogen and, thus, had no natural immunity. The devastating result was that the Natives died by the thousands.[1,2, 6]

During the War for Independence, the Continental Army (as well as the populace) expressed concern that the British would use smallpox to decimate the colonies; after all, the British troops had earlier used this method to quell an enemy, and British military deserters helped fan the flames of fear by spreading rumors of Boston citizens being exposed to infection in hopes of spreading it to colonial troops.[7-9]

General George Washington realized his men were more susceptible to smallpox than were the British, who had been previously exposed to the disease through the epidemics that impacted Europe for centuries. Although Washington had his men inoculated, the Continental Army still suffered a forty percent mortality rate from smallpox, not to mention additional casualties from other problems encountered as a result of wartime conditions.[10] Smallpox spread rapidly throughout the land; as it spread it decimated the various native peoples both in Mexico and in territories that would eventually be annexed to become part of the US between 1600 and 1800s.[7,8] History tells us that once the native peoples were exposed to smallpox, along with other diseases such as measles, pocket epidemics resurfaced every five to ten years in different regions eventually encompassing all of North America from Mexico to Alaska.[11]

Smallpox Epidemics

Smallpox is thought to have originated in Africa.[12] The disease has been implicated in several ancient wars, as well as being credited with the weakening of the Roman Empire.[13] Smallpox epidemics appear to have

arisen for periods ranging from 5 to 12 years and have impacted all the continents—with the exception of Antarctica. In some locations (such as Newark, NJ), minor outbreaks seemed to occur annually.[14]

Smallpox epidemics have occurred as far back as the 1300s in Egypt, as revealed by the remains of the Pharaoh Rameses V who apparently died from the disease.[11,15] Smallpox epidemics continued to plague the Egyptians, Greeks, and Romans.[13] By the 1500s, smallpox had found its way to various native peoples of the New World primarily through invading armies.[16]

Table 1. Differentiation of Terms

Terms	*Explanations* [a]	*Comments* [15]
Variolation	The deliberate introduction of the smallpox virus into an uninfected person as a prophylaxis against the severe form of smallpox.	This is an obsolete term meaning to expose the skin to the active virus from the lesion of an infected person.
Inoculation	The introduction of a pathogen or antigen into a living organism to stimulate the production of antibodies.	Exposure to smallpox via the skin. Since this did not involve the respiratory tract the person would have a milder case of smallpox .
Vaccination	The introduction into man or animal of microorganisms that have been treated to make them harmless for the purpose of inducing immunity.	The original vaccine came from cows (Vacca) Cowpox is less virulent than variola virus.

a. Webster's Medical Desk Dictionary

The annual number of deaths due to smallpox in Europe alone was approximately 400,000 during the late eighteenth century.[12] During this time, inoculations or vaccinations were already being utilized to halt the spread of the disease. Smallpox remained a problem throughout the nineteenth and first half of the twentieth century. According to Slifka,[17] the last naturally occurring case in the US occurred in 1949; yet, worldwide, deaths from smallpox remained in the millions in the 1960s.[12,17]

In 1967, a worldwide concerted effort to eliminate the disease was implemented by the World Health Organization (WHO).[12,18,19] After a ten year collaborative effort, the only remaining smallpox virus were in specific laboratories where the samples were utilized for scientific studies. The WHO mandated that laboratories storing the variola virus destroy and dispose of their supplies. Only two reference laboratories would be allowed to keep a supply of virus: the Russian Institute of Virus Preparations and the United States Centers for Disease Control (CDC).[1,20] After long-term studies (and in spite of the fact that no transmission vector has ever been determined), in 1980, three years after the last naturally occurring case was reported, the WHO officially declared smallpox to be eradicated.[12,19-24]

Vaccinations

The chronology of how smallpox vaccination came about is most interesting. Several reference accounts to inoculations are documented as early as 3000 B.C. in Egypt.[11,12] Shelton[25] referred to the use of inoculations in India as far back as 1500 B.C., and descriptions of how cows were used to develop a smallpox vaccine have also been entered into the annals of smallpox history.[25,26]

The use of vaccines to stave off contagion has occurred in various formats throughout the ancient world.[11,25,26] Inoculations pre-dated Christianity in China, and, during the Middle ages, vaccinations were being used in Denmark.[11] By the 1700s, vaccinations were being employed by most of the modern world. Public vaccinations were not always mandatory, though citizens often thought they were obligated. In Newark, N.J., when government physicians appeared to vaccinate entire households, people often hid rather than refused.[14,27] During these periods of time, it is interesting to note that the terms inoculation and vaccination were not interchangeable (see *Table 1*). For inoculations, the live virus was used—causing the patient to develop a milder form of the disease in hopes of developing immunity. Persons opting for this method were forced to leave the city until they were no longer contagious. The person infected with the disease was considered to be as contagious as if they had naturally contracted the disease.[14,27]

The oldest known variolation recorded recounted a Buddhist Nun in the eleventh century[23] who would take scabs from an infected person, grind them into a powder, and blow the dry powder into the nose of an uninfected person in hopes of preventing that person from getting the disease.[12,23] Modern-day vaccinations began in England in 1796 when Dr. Edward Jenner discovered that cowpox, a less virulent form of orthopox viral species, gave immunity against the deadly variola virus.[12,19,23]

Modern Day Issues

Eradication—the Possibilities

There have been several other attempts at eradication of epidemic-causing diseases such as malaria and yellow fever. Though these attempts were less successful than those put forth toward eradicating smallpox, the processes served to garner information about the diseases such as: (1) a better understanding of the interactions between social and economic issues that impact the success of such programs and serve as the impetus for new attempts at

eradication; and (2) determination of "reservoirs," vector, and modes of transmission that play major roles in whether or not eradication is probable, let alone possible.[28] Since the late 1800s, there have been international meetings to discuss eradication.[28] In 1993, the International Task Force for Disease Eradication explored the candidacies of 80 diseases thought to have the potential for eradication; however, only six fit the criteria for possible eradication.[28]

In 1997, several scientists gathered in Germany as the Dahlem Workshop on the Eradication of Infectious Diseases. This group of scientists established a set of parameters to help determine where various diseases fit in the scheme of eradication. They also defined the terms used relative to measuring how well the health community has contained any disease or infection (see *Table 2*).[28]

TABLE 2. DEFINITION OF PARAMETERS

Term	*Definitions*	*Disease Examples*
Control	Reduction of disease incidence, prevalence, morbidity or mortality to a locally acceptable level as a result of deliberate efforts; continued intervention measures are required to maintain the reduction.	Diarrheal diseases
Elimination of disease	Reduction to zero of the incidence of a specified disease in a defined geographical area as a result of deliberate efforts; continued intervention measures are required.	Neonatal tetanus
Elimination of infections	Reduction to zero of the incidence of infection caused by a specific agent in a defined geographical area as a result of deliberate efforts; continued measures to prevent re-establishment of transmission are required.	Measles, Poliomyelitis
Eradication	Permanent reduction to zero of the worldwide incidence of infection caused by a specific agent as a result of deliberate efforts; intervention measures are no longer needed.	Smallpox
Extinction	The specific infectious agent no longer exists in nature or in the laboratory.	None

From CDC–MMWR: The Principles of Disease Elimination and Eradication[27]

Not every infectious disease fits into this scheme. Both biological and technical differences impact the ability of a pathogen to be eradicated.[28] With future medical and technological advances, there exists the possibility that a disease currently thought not to be a candidate for eradication will become more eradicable.

Eradication of smallpox has also created a problem. With the existence of smallpox virus in laboratories in both Russia and the U.S., there will always be the possibility of human error and also the human desire to promote one's own agenda by threatening to use these stockpiles to induce an epidemic. While older generations may still retain some immunity to the threat of smallpox, younger generations that fall into the non-vaccinated population will be vulnerable.[2, 29]

Present-Day Vaccinations

Adverse responses to vaccinations have been a problem from the beginning. Usually, a live, though weak strain of the virus is used; therefore, negative reactions (in addition to the expected scabbing over of the vaccination site) can occur.[30-32] There have even been several references to the fatal reactions to inoculations.[17,33] When reading of such extreme reactions, one asks, was it the vaccine or one or more additional contributing factors—such as sanitation conditions of the surrounding environment, the vaccine vehicle, the state or potency of the virus used in vaccine preparation, possible contamination of the vaccine itself—that catalyzed such a negative reaction? When anything is introduced into the body, there is associated risk, e.g., sensitivity to the virus, infection or even death.

There has also been controversy concerning the effectiveness of vaccinations. Several reports have demonstrated that mortality rates for smallpox increased dramatically in regions or countries where vaccinations were mandatory, in contrast to those regions or countries where there were no vaccinations were taking place.[11,34] When one investigates further, one can observe that these claims may be exaggerated and that other parameters were involved, such as unsanitary conditions and/or non-sterile needles.[35] There are several studies that have shown neurovirulence and death following the use of the live virus.[17,36] Dryvax, manufactured by Wyeth, is a live replicating virus made from calf lymph.[17,36] One problem noted with this compound was the inconsistency of the viral mix.[17] Another problem noted was the bacterial contamination found in Dryvax once reconstituted.[17,37]

The risks associated with vaccination may make physicians apprehensive and possibly provide reasons to withhold the administering of these injections or refuse to cooperate with the current plan to vaccinate thousands of medical personnel in the event of a smallpox attack. The risks associated with vaccinations have led at least 80 hospitals (chosen to participate in the large-scale vaccination program being promoted by the current administration) to withdraw their participation in such an effort.[38] As more and more doctors review the plan and weigh the risks versus benefits, the number of medical personnel refusing to take part in a preemptive strike at possible bioterrorist actions increases.[38,39] A common

thought is that if this event does occur, there would be sufficient time to vaccinate if and when the need arises.[39,40]

The CDC publishes a fact sheet available on its website that lists several reasons why a person should not be vaccinated unless there is an emergency situation—such as a bioterrorist attack using smallpox. This list is extensive; healthcare personnel should become familiar with these associated contraindications and, in turn, educate the soon-to-be-vaccinated.[39,40]

Slifka[17] reports that there is an alternative on the horizon; a weaker vaccine, which is a modified vaccinia virus called Ankura (MVA)—made under sterile conditions in Germany—is deemed safer than the traditional vaccine. Unfortunately, this preparation was not able to be tested against the disease itself since, at the time of its inception, smallpox had been "eradicated." Ankura was initially conceived for use as a "primary vaccination" with a follow-up vaccination, or booster, with the variola vaccine.[17] Two additional vaccines have been developed, NYVAC and ALVAC; however, the viruses contained in these vaccines are non-replicating. Future clinical trials will need to be performed in order to compare the effectiveness of vaccines prepared with these viral strains with traditional vaccines such as Dryvax.[17,40,41]

Thimerosal

Although smallpox vaccine, Dryvax, did not include the preservative thimerosal, we believe it is an area of concern to parents. Parents may not be aware that thimerosal was not used in the smallpox vaccine. Also, with the possibility of new vaccines for smallpox, preservatives may reemerge as an issue.

In order to preserve multi-injection vials of vaccinations, pharmaceutical companies have incorporated the use of thimerosal, an ethylmercury-based preservative.[42-45] A circumstantial link between thimerosal-containing vaccinations and the rise in the development of autism or possibly other neurodevelopmental disorders has been proposed.[43-48] Other studies have shown that thimerosal produces an immunosuppressive effect in mice. Even a case of macularpapular eruption in a patient receiving thimerosal (contained in a flu vaccination) was supposedly associated with this ingredient.[49,50] It has also been suggested that the autism resulting from thimerosal may actually be due to mercury poisoning, not necessarily the active viral agent. To add further confusion to this controversy, a Danish study[51] reported there was a greater incidence in autism after the discontinuation of the use of thimerosal. Additionally, the criteria for what constitutes autism, how it is diagnosed and the methods of case reporting have been improved and updated[52] in that the incidence of children developing autism has increased significantly from 1 in 2500 (pre-1970) to 1 in 500 in 1996.[51-53] By 2000, the estimated incidence of autism was 1 in 150.[53] Despite what the Danish study reports, the timing of the vaccination period still lends many to associate vaccine use with this increase.

It is important for physicians to recognize these issues when administering vaccines and to better educate parents on the possible dangers associated with vaccination, whether thimerosal is the incorporated preservative or not.

Bigham and Copes[44] concluded that it would be a better use of our resources to use the tested vaccines with thimerosal to protect children in the developing areas of the world rather than investing our time in developing thimerosal-free vaccines. The FDA[54] created a site which explains the impetus behind adding preservatives to vaccines and discusses the various issues that have emerged since the advent of thimerosal. The FDA and the CDC have worked toward the elimination of heavy metals in vaccines and have encouraged research into the problems associated with the introduction of heavy metals.[54,55] In 1999, the CDC, the Academy of Pediatrics, and the US Public Health Service published a joint statement requesting that manufacturers of vaccines "phase out" thimerosal use in such vaccines as quickly as possible.[55,56] The FDA now provides a list of updated vaccines and the content of preservatives.[54]

Center for Disease Control (CDC) Classifications:

Understanding the classifications of pathogens or chemical agents helps us understand the seriousness of such an agent. Although specific criteria are used to determine the level of threat, the most important by far is the ease in which an agent can be dispersed. Of course, how deadly the agent can be once dispersed also impacts the decision of which category in which to place the agent. The following tables were taken from the CDC web site.[57]

The highest priority and worst-case scenarios are categorized as level "A". One such example is smallpox.

Category "A"

- can be easily disseminated or transmitted from person to person;
- results in high mortality rates and has the potential for major public health impact;
- might cause public panic and social disruption; and
- requires special action for public health preparedness

The next level of threat is Category "B." Ricin falls into this category.

Category "B"

- is moderately easy to disseminate;
- results in moderate morbidity rates and low mortality rates; and
- requires specific enhancements of CDC's diagnostic capacity and enhanced disease surveillance.

The last category, "C," is not necessarily less threatening than category "A," but because of more recent emergent strains, diseases contained in "C" are much more likely to be bioengineered for mass dissemination. Hanta virus is one of the emerging infectious diseases

Category "C"

- is readily available;
- easily produced and disseminated; and
- has an increased potential for high morbidity and mortality rates and major health impact.

Smallpox a Category "A" Disease

Orthopoxvirus

Smallpox is an extremely virulent disease and can be caused by any of the following four species of the *Orthopoxvirus*.[1,58]

- Variola is the main Orthopoxvirus involved in widespread smallpox epidemics.19
- Vaccinia can affect humans as well as other vertebrate hosts. This particular strain of the virus is closely related to the cowpox virus and was, therefore, the species used for vaccinations.19
- Cowpox is thought to also affect humans, though it is thought to be spread to cows by cats. Rodents have also been shown to be affected by this species. Cowpox has also been used for vaccinations.19,21
- Monkeypox, which received its name by virtue of the initial outbreak recorded occurring in a colony of African monkeys, can infect both humans and rodents. Cases of Monkeypox have been documented in the US.19,59,60

The variola species of the virus is that which has infected humans in epidemic proportions.[12,19,21] In addition to transmission of the disease by dermal exposure, variola infects the respiratory system, thereby making it more virulent.[12,19,21] Prior to vaccination in its various forms, this disease had mortality rate as high as 30%.

Orthopoxvirus is a genus of the family poxviridae, subfamily chordopoxvirninae.[61] Even today, we do not have any drugs that will work on this disease. As stated previously, Smallpox is considered of one of the highest-risk agents for use as a biological weapon because of its very high mortality rate and speed of transmission and spread, which speak to its virulence; likewise, its lack of effective treatment once the disease has been contracted adds to the danger.[2] Since smallpox can resemble chickenpox—once considered an ordinary disease seen in childhood—it is very possible to misdiagnose early cases of smallpox, especially since present-day physicians normally would not expect to see a case of smallpox. This mistake would allow for time lost and, therefore, contribute to the disease's subsequent spread.[2,62-66]

During the incubation period of smallpox, between 7-17 days, the infected person is considered non-contagious. After the internalization of the smallpox microbes, they invade the liver and spleen where they reproduce rapidly. Once symptoms arise, the patient is highly contagious and will remain so until all scabs have dried up and detached from the skin.[19,66]

The initial manifestations of smallpox resemble those of the flu, such as fever, vomiting and fatigue. The first visible signs appear internally in the buccal or pharyngeal areas. The sores will then appear on other areas of the skin, especially on the torso. These sores tend to be pus-filled—making them contagious, for they can be rubbed onto clothes, sheets, and blankets and other items. This ease of transference makes them deadly carriers if appropriate measures of handling and cleaning are not observed and performed.[19,66]

Although the last known naturally-occuring case of smallpox occurred in 1977 in Somalia, the WHO continued to vaccinate until 1980 when the World Health Assembly declared smallpox officially eradicated.[1,18,65-67]

TABLE 3. DESCRIPTIVE CATEGORIES OF SMALLPOX

Category	*Percent of Cases*	*Mortality Rate*
Classical	>90% of cases, includes sub-types of rash	
	Discreet	10%
	Confluent	50-75%
Malignant (flat)	atypical velvety rash which never matures into pustules	>90%
Hemorrhagic	a more diffuse erythematous rash leading to petechiae and hemorrhages	Uniformly fatal

From: Bioterrorism Fact Sheet[68]

The military continued vaccinations into the 1980s. The vaccine used was Dryvax (Wyeth-Ayerst).[54] This contained a fairly harmless, closely-related virus known as vaccinia. Since the vaccinia virus was similar to smallpox, it allowed the body to produce antibodies that could also attack the smallpox virus.[52, 66]

Several decades have passed since the last popularized vaccinations were administered. Due to that time lapse, susceptibility has posed a new threat in this age of bioterrorism. We now have a worldwide population of unvaccinated and vulnerable people.[2,18] We need to familiarize ourselves with the signs and symptoms of this former menace. There are three main categories of smallpox—classified according to the type of rash that develops (see *Table 3*). Fortunately, the two most deadly forms rarely occur.

Table 4. Comparison of Smallpox and Chickenpox

	Smallpox[21]	*Chickenpox*[73]
Virus	Variola Orthopox virus	Varicella-zoster virus
Vector	Humans only	Humans only
Contagious	Highly contagious	Highly contagious
Transmitted	Person-to-person (Airborne)	Person-to-person (Airborne)
Incubation	7-17 days	10-21 days
Presentation	Early rash most contagious (4 days) Pustular Rash (5 days)	Pruritic maculopapular vesicular rash
Scabs	Postules & scabs (6 days) Scabs fall off skin, non-infectious	Dry scabs, non-infectious
Timing	~ 14-16 days contagious	~ 5-6 days contagious

The Differentiation of Smallpox from Chickenpox

A national crisis can be averted if physicians are prepared to make a rapid, yet accurate, diagnosis that will set the emergency preparedness into motion. The greatest foreseeable problem is the ability of the doctors to recognize the difference(s) between the symptoms associated with chickenpox and those associated with smallpox. Since the last case of smallpox occurred over 50 years ago in the U.S. and over 25 years ago outside of the U.S., doctors under the age of 70, more than likely, have not had the opportunity to observe, let alone treat this dangerous disease. In 2000, 17 physicians from seven hospitals in the Pittsburgh area participated in an exercise in which 16 of the doctors failed to recognize and diagnose smallpox, even when suggested by an emergency-room employee who was also participating in this exercise.[69] The doctor who guessed correctly was one of two infectious disease specialists participating in this exercise.[69] Another study utilizing a survey instrument revealed that most physicians could distinguish the two diseases only when the physical sores had manifested, and they had images of both diseases available for comparison. When it came to answering critical questions concerning the diagnosis of such, only 36% were able to answer correctly.[70]

One feature that has always been considered a hallmark of smallpox was a fever in combination with one of several other initial symptoms. Called smallpox febrile prodrome, it includes fever and any one of the following:

- Headache
- Backache
- Chills
- Vomiting, or abdominal pain

Moore et al. studied chickenpox during a 21-month period and compared the prodromal presentations with historical data from smallpox prodromes. Their findings suggest that the use of a febrile prodrome is not sufficient enough to differentiate between the two diseases.[71-74] The CDC has developed an algorithm to educate physicians for purposes of differential diagnoses.[71-73] *Table 4* can be used to help identify critical visual presentations and a timetable of contagion.

The Physician's Role

Physicians are not as knowledgeable about smallpox as one would hope, mainly due to lack of occurrence and training for diagnosis and treatment for this disease. The CDC receives calls from around the country every year asking for help from doctors who can not identify nor explain unusual rashes. Chickenpox has some similarities to smallpox, and approximately seventy-five percent of Americans have been vaccinated against chickenpox. This has led to the significant decline in the number of cases seen each year, though it is by no means eradicated. Specifically, approximately 4 million cases of chickenpox were the norm before the advent of the vaccination program in 1995. That number has now dropped to 600,000.[75] Due to the number of vaccinations needed each year, chickenpox vaccine stores were low in 2002, and health professionals expressed concern that reported cases of chickenpox would instigate a smallpox scare, if misdiagnosed.[76,77] Thankfully, the shortage was short-lived. Physicians need to keep abreast of availability of vaccines in order to make the best use of this resource for immunocompromised patients. The need for physicians to be trained in bioterroristic possibilities is obvious, as seen in the amount and availability of training modules found on the internet (see *Table 5*).

The Department of Homeland Security can only be as effective as public awareness will allow. It will be an educated and alert public that will serve as an information

TABLE 5. WEBSITE SOURCES FOR INFORMATION

Web Site URL	*Type of information*
http://www.bt.cdc.gov/agent/agentlist-category.asp	CDC list of bioagents
http://www.bioterrorism.uab.edu/eipba.html	University Educational
http://jama.ama-assn.org	Journal for the American Medical Association
http://www.hhs.gov/disasters/index.shtml	Dept. of Health and Human Services
http://www.phppo.cdc.gov/han/	Health Alert Network
http://www.jhsph.edu/CPHP/Training/Online%20Training/intro_to_wmd.html	Training site for physicians
http://www.TrainingFinder.org	Lists 100 training sites
http://www.bt.cdc.gov/training/index.asp	Webcast site
www.ahrq.gov/about/cpcr/bioterr.pdf	Questionnaire
http://www.ahcpr.gov/news/press/pr2002/bioterrpr.htm	Check-list on preparedness
http://www.nursing.hs.columbia.edu/institute-centers/chphsr/btcomps.html	Competencies for public health workers

bridge between the government and doctors, pharmacists and other healthcare personnel. A Health Alert Network[78] (HAN) is currently being developed whose function is to create a network of linked health centers and health officials across the nation. It is expected that this network should increase the speed at which information is disseminated from one part of the country to another via the internet.[78]

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REFERENCES

1 Henderson DA. MMWR Eradication: Lessons from the Past. December 31, 1999;48(SU01):16-22.

2 Whitley RJ. Smallpox: a potential agent of bioterrorism. Antiviral Res. 2003;57(1-2):7-12.

3 Darby SM, Miller ML, Allen RO. Forensic determination of ricin and the alkaloid marker ricinine from castor bean extacts. J Forensic Sci. 2001;46(5):1033-42.

4 From Joseph Farah's G2 Bulletin. Al-Qaida south of the border. Available at: http://worldnetdaily.com/news/article.asp?ARTICLE_ID=37133. Accessed February 18, 2004.

5 Frequently asked questions: likelihood of terrorists acquiring and using chemical or biological weapons. Henry L. Stimson Center. 2003. Available at: http://www.stimson.org/cbw/?SN=CB2001121259. Accessed February 9, 2004.

6 d'Errico P. Available at: http://www.nativeweb.org/pages/legal/amherst/lord_jeff.html#1. Accessed February 9, 2004.

7 Fenn EA. Pox Americana: The Great Smallpox Epidemic of 1775-82 [NY: Hill and Wang; 2001]. Available at: http://www.nativeweb.org/pages/legal/amherst/fenn.html. Last accessed May 2, 2005.

8 Gill HB. Colonial germ warfare. US Army Maneuver Support Center 2004. CML Army Chemical Review October 2004. Available at: http://www.history.org/Foundation/journal/Spring04/warfare.cfm.

9 PBS. American Revolution. Available at: http://www.pbs.org/wgbh/nova/bioterror/hist_nf.html#amer. Last accessed April 29, 2005.

10 Hoover Archives. Why did it take so long? Threats to the Continental Army: starvation, disease, casualties, capture. Available at: http://hoover.archives.gov/exhibits/RevAmerica/5-Why/Threats.html. Last accessed May 1, 2005.

11 Vaccination Liberation Information. Smallpox inoculation—a timeline with comments. Available at: http://www.vaclib.org/basic/smallpox.htm. Last accessed May 3, 2005.

12 Sowers H. Smallpox. Course # 056-950. California Association for Medical Laboratory Technology Distance Learning Program. Available at: http://www.camlt.org/DL_web/950_smallpox.html. Last accessed May 5, 2005.

13 Smallpox. The smallpox vaccine: what you should know. 2002. Available at: http://thinktwice.com/smallpox.htm. Last accessed May 4, 2005.

14 Old Newark History: Smallpox epidemics (variola). Available at: http://www.oldnewark.com/histories/smallpox.htm. Last accessed May 4, 2005.

15 Wikipedia. Smallpox. Available at: http://en.wikipedia.org/wiki/Smallpox. Last accessed April 29, 2005.

16 Porterfield KM. Timeline of European disease epidemics among American Indians. 2004. Available at: http://www.kporterfield.com/aicttw/articles/disease.html. Last accessed May 1, 2005.

17 Slifka MK. The future of smallpox vaccination: is MVA the key? Med Immunol. March 1 2005;1;4(1):2.

18 Fenner F, Henderson DA, Arita L, Jesek Z, Ladnyi ID. Smallpox and Its Eradication. Geneva: World Health Organization; 1988.

19 Diven GD. CME An overview of poxviruses(CME). J Am Acad Dermatol. January 2001; 44:1-14.

20 World Health Organization (WHO). 1980. Available at: http://www.who.int/emc/diseases/smallpox/factsheet.html. Accessed June 8, 2004.

21 CDC. Smallpox overview fact sheet. Available at: http://www.bt.cdc.gov/agent/smallpox/overview/disease-facts.asp. Last accessed May 2, 2005.

22 Henderson DA, Inglesby, TV, Bartlett, MD, et al. Medical and Public Health Management. The Working Group on Civilian Biodefense. Smallpox as a Biological Weapon. JAMA. 1999;281:2127-2137.

23 Bannon H. The history of Smallpox. Available at: http://dermatology.about.com/cs/smallpox/a/smallpox.htm. Last accessed May 3, 2005.

24 Bannon H. Smallpox. Available at: http://dermatology.about.com/cs/a/smallpox.htm. Last accessed May 3, 2005.

25 Shelton HM. Vaccinia. Available at: http://www.whale.to/vaccines/shelton3.html. [In: Vaccines and Serum Evils. Chapter 1; 1940s]. Last accessed May 4, 2005.

26 McBean E. The poisoned needle: suppressed facts about vaccination. 1957. Available at: http://www.vaccinationnews.com/DailyNews/June2002/PoisonedNeedle18.htm. Last Accessed May 4, 2005.

27 Colgrove J. Between persuasion and compulsion: smallpox control in Brooklyn and New York, 1894-1902. Bulletin of the History of Medicine. 2004;78(2):349-378.

28 Dowdle WR. The principles of disease elimination and eradication. CDC. December 31, 1999;48(SU01):23-27. Available at: http://www.cdc.gov/epo/mmwr/preview/mmwrhtml/su48a7.htm.

29 Henderson DA , Fenner F. Recent events and observations pertaining to smallpox virus destruction in 2002. Clinical Infectious Diseases. 2001;33:1057-1059.

30 Aslam M, Aslam J, Mitchell BD, Munir KM. Association between smallpox vaccination and hepatitis C antibody positive serology in Pakistani volunteers. J Clin Gastroenterol. March 2005;39(3):243-246.

31 Wollenberg A, Engler R. Smallpox, vaccination and adverse

reactions to smallpox vaccine. Curr Opin Allergy Clin Immunol. August 2004;4(4):271-275.

32 A smallpox vaccination disaster record. [The Vaccination Inquirer. Vol 5. May 1883.] Available at: http://www.whale.to/vaccines/smallpox2.html. Last Accessed May 4, 2005.

33 Cassimatis DC, Atwood JE, Engler RM, Linz PE, Grabenstein JD, Vernalis MN. Smallpox vaccination and myopericarditis: a clinical review. JACC. May 5, 2004;43(9):1503–1510.

34 Krasner, G. The dangers of smallpox vaccination. Available at: http://www.naturodoc.com/library/public_health/truth_re_smallpox_vaccine.htm. Last accessed May 4, 2005.

35 Drucker E, Alcabes PG, Marx PA. The injection century: massive unsterile injections and the emergence of human pathogens. Lancet. December 8, 2001;358:1989-1992.

36 FDA. Dryvax Insert. Available at: http://www.fda.gov/cber/label/smalwye102502LB.htm#desc. Last accessed May 9, 2005.

37 Wyeth Laboratories, Inc. Package Insert Dryvax® (Smallpox Vaccine, Dried, Calf-Lymph Type). Avaiable at: http://biotech.law.lsu.edu/blaw/bt/smallpox/DRYVAX_label.htm. Last accessed May 5, 2005.

38 Parker L. Hospitals balk at smallpox vaccine. More doctors consider risk to staff too great. USA Today. Jan 2003. Available at: http://www.usatoday.com/usatonline/20030121/4794957s.htm. Last accessed April 29, 2005.

39 Cooper LZ. Press statement on smallpox, flu and tetanus vaccines for children. American Academy of Pediatrics. June 21, 2002. Available at: http://www.aap.org/advocacy/releases/acip.htm. Last accessed May 5, 2005.

40 CDC. Smallpox (vaccinia) vaccine contraindications. Available at: http://www.bt.cdc.gov/agent/smallpox/vaccination/contraindications-clinic.asp. Last accessed April 29, 1995.

41 Horne AD, Clifford J, Goldenthal KL, Kleppinger C, Lachenbruch PA. Preventive vaccines against bioterrorism: evaluation of efficacy and safety. Vaccine. 2004;23:84–90.

42 Bernard S, Enayati A, Redwood L, Roger H, Binstock T. Autism: a novel form of mercury poisoning. 2000. Available at: http://www.mercola.com/2000/oct/1/autism_mercury.htm. Last accessed May 1, 2005.

43 Davidson PW, Myers GJ, Weiss B. Mercury exposure and child development outcomes. Pediatrics. April 2004:113(4 Suppl):1023-9.

44 Bigham M, Copes R. Thiomersal in vaccines: balancing the risk of adverse effects with the risk of vaccine-preventable disease. Drug Saf. 2005;28(2):89-101.

45 Geier DA, Geier MR. A two-phased population epidemiological study of the safety of thimerosal-containing vaccines: a follow-up analysis. Med Sci Monit. March 24, 2005;11(4):CR160-170.

46 Geier DA, Geier MR, An assessment of the impact of thimerosal on childhood neurodevelopmental disorders. Pediatr Rehabil. April-June 2003;6(2):97-102.

47 Geier DA, Geier MR. A comparative evaluation of the effects of MMR immunization and mercury doses from thimerosal-containing childhood vaccines on the population prevalence of autism. Med Sci Monit. 2004;10(3):PI33-39.

48 Geier D, Geier MR. Neurodevelopmental disorders following thimerosal-containing childhood immunizations: a follow-up analysis. Int J Toxicol. November-December 2004;23(6):369-76.

49 Lee-Wong M, Resnick D, Chong K. A generalized reaction to thimerosal from an influenza vaccine. Ann Allergy Asthma Immunol. January 2005;94(1):90-4.

50 Havarinasab S, Haggqvist B, Bjorn E, Pollard KM, Hultman P. Immunosuppressive and autoimmune effects of thimerosal in mice. Toxicol Appl Pharmacol. April 15, 2005;204(2):109-21.

51 Madsen KM, Lauritsen MB, Pedersen CB, Thorsen P, Plesner AM, Andersen PH, Mortensen PB. Thimerosal and the occurrence of autism: negative ecological evidence from Danish population-based data. Pediatrics. September 2003;112(3 Pt 1):604-6.

52 NICHD. Autism Facts. June 2001. Available at: http://www.nichd.nih.gov. Last accessed April 29, 2005.

53 Cave S. Autism and mercury. Bio-Probe News. July 18, 2000. Available at: http://www.bioprobe.com/ReadNews.asp?article=27. Last accessed May 4, 2005.

54 FDA. Thimerosal in vaccines. March 25, 2005. Available at: http://www.fda.gov/cber/vaccine/thimerosal.htm#pres. Last accessed May 4, 2005.

55 CDC Joint Statement (concerning Thimerosal) of the American Academy of Pediatrics (AAP) and the US Public Health Service (PHS). July 7, 1999. Available at: http://www.cdc.gov/nip/vacsafe/concerns/thimerosal/thimerosal-AAP&PHS.htm. Last accessed May 4, 2005.

56 CDC Joint Statement Concerning Removal of Thimerosal from Vaccines. June 22, 2000. Available at: http://www.cdc.gov/nip/vacsafe/concerns/thimerosal/joint_statement_00.htm. Last accessed May 4, 2005.

57 CDC Bioagent List. Available at: http://www.bt.cdc.gov/agent/agentlist-category.asp. Accessed February 9, 2004.

58 Mahoney MC, Symons AB, Kimmel SR. Smallpox: clinical highlights and considerations for vaccination. JPGM. 2003;49(2):141-147.

59 Guarner J, Johnson BJ, Paddock CD, Shieh W-J, Goldsmith CS, Reynolds MG, Damon IK, Regnery RL, Zaki SR, and the Veterinary Monkeypox Virus Working Group. Monkeypox transmission and pathogenesis in prairie dogs. Emerging Infectious Diseases. March 2004;10(3). Available at: http://www.cdc.gov/eid. Accessed Apr 29, 2005.

60 Microbiology @ Leicester: Virology: Poxviruses. April 2005. Available at: http://www-micro.msb.le.ac.uk/3035/Poxviruses.html. Last accessed May 11, 2005.

61 Smallpox (Extensive Information). UAB Center for Disaster Preparedness Web site. Available at: http://www.bioterrorism.uab.edu/EIPBA/Smallpox/moreExtInfo.html. Accessed February 13, 2004.

62 Pennington, H. Smallpox and bioterrorism. Bulletin of World Health Organ. 2003;81(10):762-767.

63 Meltzer MI, Damon I, Le Duc JW, Millar JD. Modeling potential responses to smallpox as a bioterrorist weapon. Emerg Infect Dis. 2001;7:959-969.

64 Lofquist JM, Weimert NA and Hayney MS. Smallpox: a review of clinical disease and vaccination. Am J Health Syst Pharm. 2003, 60 (8) :749-56.

65 Fenner F. Poxviruses. In: Richmond DD, Whitley RJ, Hayden FG, eds. Clinical Virology. 2nd edition. Washington, DC: ASM Press; 2002:359-374.

66 History. Smallpox. Available at: http://www.stanford.edu/group/virus/1999/reynafue/history.html. Accessed February 13, 2004.

67 Bioterrorism Agent Fact Sheet. Smallpox/Variola virus. Center for the Study of Bioterrorism. Available at: http://www.bioterrorism.slu.edu/smallpox/quick/smallpox01.pdf. Accessed May 11, 2005.

68 Enserink M. Infectious diseases: US Monkeypox outbreak to wisconsin pet dealer. Science. June 13, 2003;300(5626):1639.

69 Silver JD. Local doctors fail their test on diagnosing germ terrorism. Post-Gazette (PG News). February 13, 2000. Available at: http://www.post-gazette.com/healthscience/20000213biowar3.asp.

70 Woods R, McCarthy T, Barry MA, Mahon B. Diagnosing smallpox: would you know it if you saw it? Biosecur Bioterror. 2004;2(3):157-63.

71 Moore ZS, Seward JF, Watson BM, Maupin TJ, Jumaan AO. Chickenpox or Smallpox: the use of the febrile prodrome as a distinguishing characteristic. Clinical Infectious Diseases. 2004;39:1810.

72 Jumaan A, Hughes H, Schmid S, Galil K, Plott K, Zimmerman L, Seward J. Varicella. In: VPD Surveillance Manual. 3rd edition. 2002:14.1.

73 CDC. Varicella Active Surveillance Project (VASP). 2005. Available at: http://www.cdc.gov/nip/diseases/surv/vasp/default.htm. Last accessed May 2, 2005.

74 Besser JM, Crouch NA, Sullivan M. Laboratory diagnosis to differentiate smallpox, vaccinia, and other vesicular/pustular illnesses. J Lab Clin Med. October 2003;142(4):246-251.

75 Educate yourself. Smallpox scare spurs Florida emergency powers bill. 2002. Available at: http://educate-yourself.org/vcd/smallpoxscarespursfloridabill17may02.shtml. Last Accessed May 3, 2005.

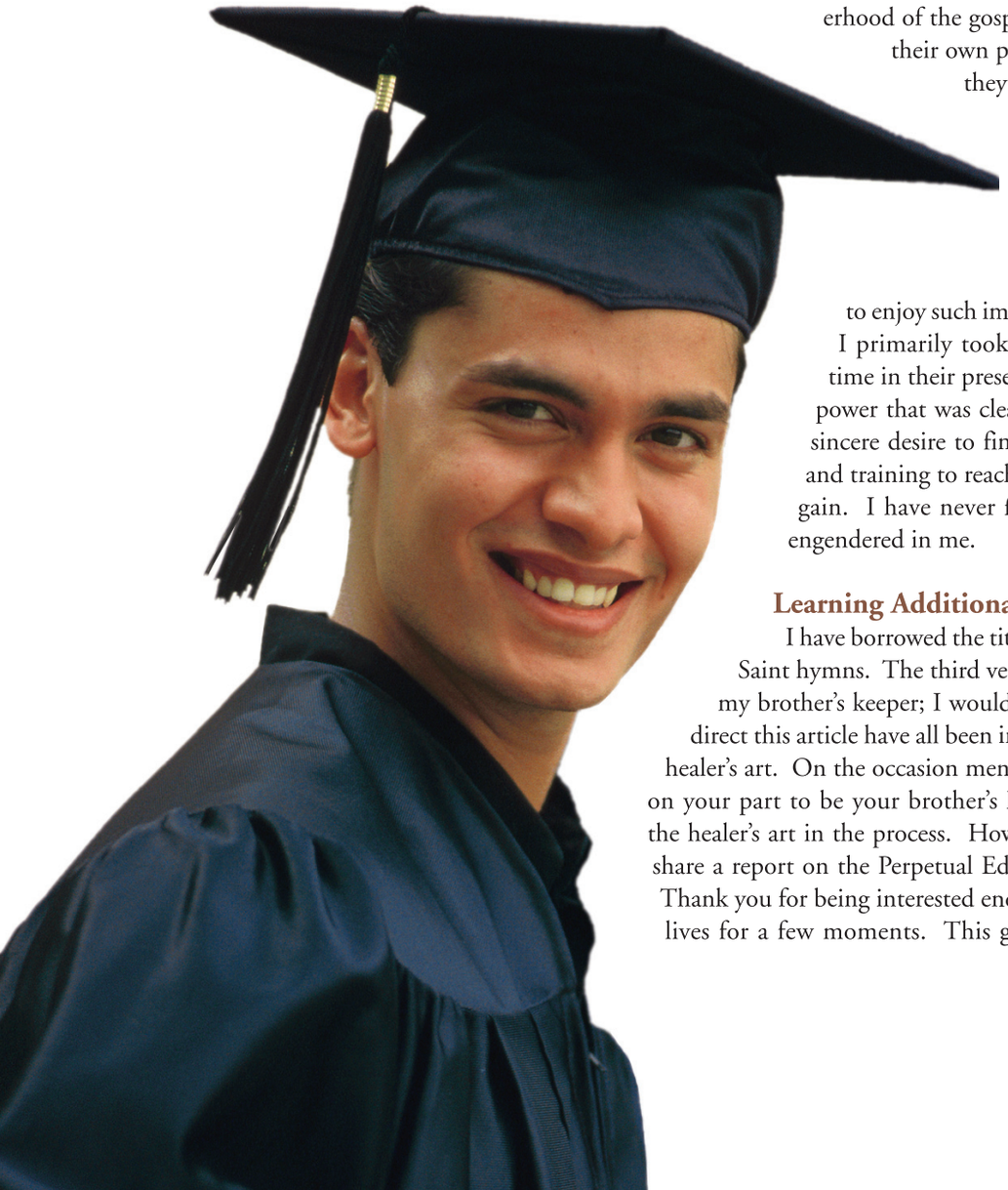
76 Varicella zoster virus and the chicken pox vaccine. Available at: http://www.cvm.uiuc.edu/courses/vp516/Varicella%20Zoster%20Virus.pdf. Last accessed May 11, 2005.

77 CDC. Questions related to shortages of Varicella vaccine. 2002. Available at: http://www.cdc.gov/nip/news/shortages/faqs_shortages_3-7-02.htm#faqsvaricella. Last accessed April 30, 2005.

78 CDC. Health Alert Network. 2002. Available at: http://www.phppo.cdc.gov/han/. Accessed February 9, 2004.

I WOULD LEARN *the* HEALER'S ART

ELDER JOHN K. CARMACK



On October 3, 2003, Collegium Aesculapium invited me to speak to their assembled group about the vision and work of the Perpetual Education Fund. I wasn't certain what I would find as I approached the room that held those gathered for the semi-annual meeting. Instead of the fairly small gathering of doctors and other professionals I expected, I entered a room full of medical doctors and other health professionals from many communities and nations of the world. They were obviously united in the brotherhood of the gospel and in the desire to serve others beyond their own professional niche. I knew instinctively that they would not be there unless the occasion was substantive and the subjects discussed important and serious. I looked around and saw many friends and acquaintances. I knew something of the tremendous investment they had all made in their education and training to enjoy such impressive standing in their professions. What I primarily took away from that opportunity of spending time in their presence was the sense of goodness and spiritual power that was clearly in the room. I also felt in the room a sincere desire to find ways to use their education, knowledge, and training to reach out to others with no thought of personal gain. I have never forgotten those moments and the feelings engendered in me.

Learning Additional Healing Arts

I have borrowed the title of my remarks from one of the Latter-day Saint hymns. The third verse of that hymn reads in part: "I would be my brother's keeper; I would learn the healer's art."[1] Those to whom I direct this article have all been in a lifelong search to learn all you can of the healer's art. On the occasion mentioned above, I sensed a deep commitment on your part to be your brother's keeper and to find additional ways to use the healer's art in the process. How else could I account for the invitation to share a report on the Perpetual Education Fund with a health-related group! Thank you for being interested enough to open that door and let us into your lives for a few moments. This gives us the opportunity to say thank you

for your past and continuing generous contributions to PEF. Those contributions have helped us in our work of assisting young adults in less-advantaged countries receive training and education in a wonderfully rich variety of disciplines leading to employment, self reliance, and hope for a decent future.

Report on PEF Progress

We are now starting our fifth year as a separate Church department dedicated to making President Gordon B. Hinckley's vision, first announced and discussed in General Priesthood Meeting on March 31, 2001, a living and breathing reality. When we started our work, we had nothing but that talk. Those inspired words became our constitution. We now share two charts that will give you a brief picture of our progress with PEF. The first chart (*Table 1, top*) provides a quick look at key participant statistics, including such things as the average length of a participant's educational program, the average cost for a year of education, the average increase in income expected by a participant upon graduation, the percentage of the brothers and sisters that have served missions, and other facts of interest. The second chart (*Figure 1, bottom*) illustrates by years the number of participants we have helped on a cumulative basis, the last and highest bar being the number of participants we project in program by the end of 2005. So far, our projections have been fairly accurate. You can see that we expect to have some 24,000 participants by the end of 2005. We would estimate that some five to ten percent of those would be studying in medically related fields.

The country where we have the greatest number of recipients (nearing 6,000) is Brazil, because of the large number of returned missionaries there. Peru and Bolivia have about 3,000 recipients, while Chile has 2,200. The program is growing in the Philippines (1,000), Central America (500), South America North (1,500), South America South (1,100), and Africa (500). Mexico has a lesser need because many local financial aid programs are available to their young people; yet, we have helped 1,800 of their young people so far. The program continues to expand to meet needs. The income from our growing corpus has kept up with the needs, but it too must expand as we serve the needs of a greater and greater number of our young men and women.

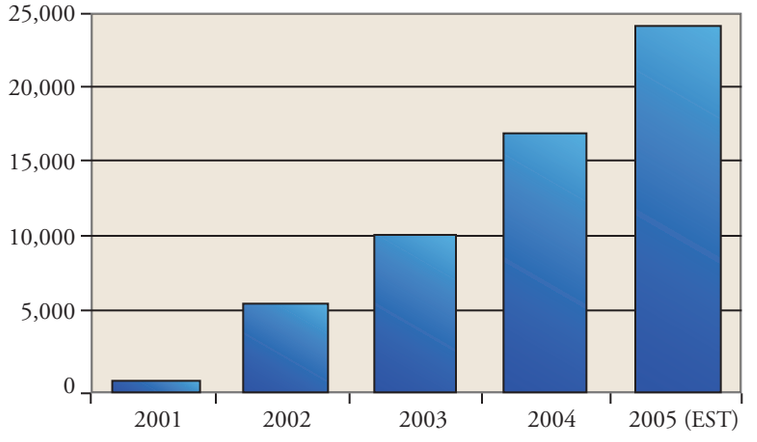
TABLE 1: KEY PEF PARTICIPANT STATISITICS

• Average program length	2.3 years
• Average cost per year	$860
• Average increase in income	4-5 times
• Average age	26
• Brothers—% of total	51%
Returned missionaries	80%
• Sisters—% of total	49%
Returned missionaries	20%
• Work while attending school	86%
• Married	32%

Our Emphasis

In granting PEF loans and providing career training for young people, our primary emphasis has been on vocational and technical skills that can prepare young people to take advantage of employment opportunities available in their own countries. Although we have made and will continue to make some loans to provide education for medical doctors and dentists, most of our loans in health-related programs will prepare our young people for employment that supports hospitals, doctors, dentists, and other professionals. Why is this so? Whereas in the United States and other developed nations we need and can support large numbers of top health professionals, the economies of most of the countries in which our PEF program has taken root have a limited capacity to afford the full range of medical services available here. Young people, however, find opportunities for employment in related fields—as nurses, medical assistants, X-ray technicians—and in other support positions in demand in those countries. In due time, some of these young people will qualify for greater education and training that will enable them to become medical doctors, dentists, and other highly trained specialists in their

FIGURE 1: PEF PARTICIPANTS BY YEAR



countries. Thus, we are helping a number of young people along a path leading to the practice of medicine and dentistry, but more are finding their way into supporting fields requiring technical training unavailable to them without help.

Tonga Experience

Most of the countries in which we operate cannot afford our very expensive and wonderful system of medicine. We can barely afford it ourselves—as all of you know.

To illustrate, I was recently in the country of Tonga to initiate PEF and investigate opportunities there. My host was one of our most experienced Church leaders. He was of great help as we visited vocational and technical schools in Tonga. There aren't many of them, and there are no medical schools in Tonga. Medical help, while available there, is primitive by our standards. We discovered that our host was experiencing pain but did not know why. Those treating him were not equipped to discover what his problem was. Since he was coming to General Conference, I arranged for him to be diagnosed and treated here. He brought his medical records with him, and in five minutes an internist discovered his problem—pancreatic cancer that had spread fairly widely in his organs. To be certain of his diagnosis, the doctor ordered tests and sent him to specialists. They confirmed the initial diagnosis. The cost of this diagnostic program was over $10,000.00. Little could be done for him. He, of course, in common with most of his countrymen, had no medical insurance. We found a way to help him with his medical bills. Wonderful medical care is available here, but at great expense. As time passes, more medical doctors, including Church members, will complete training and become healers in Tonga. We plan to help a few of the most qualified of our young adults receive that training.

Illustrative Stories

To give you some flavor of the kinds of young people we are assisting, let me share some notes of interviews Elder Cook and I enjoyed while visiting in Brazil. One young PEF recipient said this during his interview: "I didn't study before my mission, but my mission helped me gain ambition. I now am making up for the time I wasted. I couldn't find a job, but applied for and received a PEF loan. Then I found a job. In one semester, I graduate and will get a better job. My long range goal is to go to medical school." Thanks to your organization and the generosity of your members, we are going to be able to help him reach that goal if he can otherwise qualify for a medical education.

Another returned missionary named Paulo said this: "I went to the hospital for an illness I was having in company with my mother. I saw the lab workers doing their job. I said: 'Mom, I would like to work here one day.' I received one of the first PEF loans to help me become a trainee in a hospital. Then, I received a scholarship offered by the city health officer for a two-year program in lab work. Even before my training I was selected to work in the city lab. When I was offered the position I told the doctors: 'I don't know anything.' They replied they would train me. I finished my training four weeks ago. Now I work in three laboratories, one … city and two … private labs."

These poorer countries need people that have the ability to navigate in technical streams of medicine as the economy moves toward affording more advanced medical help. During that same trip, Marco told us: "I am studying to be an X-ray technician. My family is very poor. I study at great sacrifice, working during the day and going to school at night. I travel on a bicycle, often in the rain. My bishop is always at my side to help me. I got excited about equipment, and I am learning. My mission helped me a lot. Now, I want to help people."

In Lima, Peru, our associate Rex Allen met two lovely young sisters named Tatiana and Maylin Castro Estrada from the northern Peru highlands. Their father could not support them, so he simply sent them away from home to make their own way in Lima. To do so must have broken his heart. At first living on the street, they found the Church and that the PEF was available to offer help. One chose nursing as her course of study and the other medical technology. Both rose to the top in their classes. Think what this can mean to them and their family, not only for their future employment opportunities, but also as wives, mothers, and Church leaders.

In Mexico, we granted an early loan in 2001 to a young woman who wanted to become a dental hygienist. She was working at the time as a waitress, earning a little over $100 per month. As she began her training with the help of a PEF loan, she obtained a job in a dental office for about $180 a month. Ahead of her was a good job as a dental hygienist at about $600 per month.

Repairers of the Breach

The Lord has blessed many of us temporally and spiritually. As a result, we have the ability to help others that cannot progress without help: the poor we may always have with us. Such programs as fast offerings, humanitarian contributions, and the Perpetual Education Fund are designed to provide help to the needy. In the 58th chapter of Isaiah, the Prophet talked about the purposes of the fast, that were "to undo the heavy burdens and to let the oppressed go free, and that ye break every yoke."[2] Of those that were willing to help, he said: "Thou shalt be called, The repairer of the breach, The restorer of paths to dwell in."[3] That is a good description of what so many of you in the Collegium do in your professions. Many of

you provide free services to the downtrodden. In serving the downtrodden, you often help the Church as a side benefit of your good works. I have watched you serve over the years with admiration.

Side Benefits of Sharing Your Healing Arts

Back in 1993, I remember meeting Dr. Craig Merrell in Hanoi, North Vietnam, at a hospital that was woefully understaffed and without modern equipment. He and his team of surgeons and medical technicians were there to counsel with and operate on crippled and disfigured Vietnamese people. While he was giving of his professional ability freely in Vietnam, Craig also opened opportunities for the Church. Through the friends he made, we were able to bring couples into North Vietnam as English teachers. These couples made many friends for the Church and did an immense amount of good in preparation for the time we can send missionaries there. The Church has now called Dr. Merrell to preside over the France Toulouse Mission.

Those that Have Help Those that Have Not

In your medical and Church service, in a very real sense, you are like Jesus who came to earth with the riches of his status of Godhood and did for us what we who were spiritually poor could not do for ourselves. Paul seemed to understand this principle perfectly when he asked the Corinthian Saints to take care of their poor in his second epistle to them. In persuading them to be generous, he said: "For ye know the grace of our Lord Jesus Christ, that, though he was rich, yet for your sakes he became poor, that ye through his poverty might be rich."[4] Isn't that the principle behind the PEF? Isn't that also the principle behind the many great things you and your fellow health professionals do for others?

Why Only Local Schools?

One or two other principles bear emphasis. We do not bring PEF recipients to the United States or other developed countries for their education and training. Why is this? It is true that if we brought them here we could give them the best education available in the world, but they tend to stay and accept opportunities available to them in our country. The Church loses their potential leadership in their own countries, and their communities lose their services. But, who could blame them for snatching the best opportunity available to them? We need them to stay home, marry, raise families, serve their communities, and become our Church leaders.

Handouts Weaken

Since we are so wonderfully endowed temporally as a people, many ask us why we make loans instead of grants or scholarships. Our answer is that we are not primarily interested in providing education, but we are in the business of building stronger people. Giving handouts leads to an entitlement mentality and an expectation that weakens the recipients. President Packer has said on several occasions: "It has been said that if one obtained something that is worthwhile and very desirable for nothing, he has paid too dearly for it."[5]

Strategic Vision

This program has the power and potential to raise the level of the Church in the world. One radio interviewer asked me where the PEF is headed. I answered that President Gordon B. Hinckley had the vision that this would solve one of the major problems the Church faces—providing leadership in less-advantaged countries. Then, I added that this is leading the Church to be more just, stronger, and has the strategic power to eventually eliminate much of the poverty our young people face. It is taking us in the direction of Zion and the Land of Enoch.

Oneness and Gratitude

We should make one last point. We are grateful for the feeling of unity and partnership your initiative has engendered. And we feel that we together have the power to bridge the gulf between those of us that have so much by way of knowledge, education, training, and resources and those that are young, ambitious, good, and intelligent, but lack opportunity for training and education. In that sense, the PEF is a program of reconciliation with the potential to bring the Saints together as one like the City of Enoch. Thanks to all of you for all you are doing to share your healing arts and, in addition, to make contributions in service and money to other worthwhile programs such as the Perpetual Education Fund. Truly, that willingness to share and look after the needs of others is part of learning additional healer's arts, along with your very important work of repairing breaches of health in the body and, thus, restoring paths to good health.

Elder John K. Carmack is an emeritus member of the First Quorum of Seventy of The Church of Jesus Christ of Latter-day Saints, and currently serves as managing director of the Church's Perpetual Education Fund.

REFERENCES

[1] McCloud SE. Lord, I would follow thee. In: Hymns of the Church of Jesus Christ of Latter-day Saints. Salt Lake City, Ut: The Church of Jesus Christ of Latter-day Saints; 1985:220.

[2] Isaiah 58:6.

[3] Isaiah 58:12.

[4] 2 Corinthians 8:9.

[5] As quoted in Carmack JK. "The perpetual education fund: A bright ray of hope." *Ensign*. January 2004:39.

The Meek Physician

by Elder Cecil O. Samuelson, M.D.

I appreciate very much the opportunity to be with you tonight. Although my circumstances make my participation in Collegium Aesculapium both sporadic and episodic, I do value the great work that you do and the special associations of this circle.

I am having a wonderful experience at BYU. As I now near the completion of my first two years, I reflect with great appreciation on this unexpected, but grand, opportunity to learn new things and see old things from newer perspectives. One of the exhilarating, but frightening, aspects of my assignment is that on virtually every issue or topic we encounter, there are always several people who believe they know more about the matter in question than do I, and they are almost always right! Therefore, it is a special pleasure to retreat to a place among you who have backgrounds and experiences closer to my own.

One of the things that is becoming increasingly clear to me is that my distance from the day-to-day matters of medicine is growing temporally, intellectually and even emotionally. It is not so much that my interests have lagged, but only that they have been largely superceded by other responsibilities and opportunities. Increasingly, when I am asked medical questions that others seem to assume I will have a ready answer for, I must respond that you should ask your doctor or that I will try to put you in contact with a physician who can provide more reliable advice than I currently can. I don't worry much about this, but do admit that as I consider the phenomenon of my increasing distance from my great professional love of almost four decades, considerable humility is obviously needed.

I am, and have always been, grateful for the privilege of being a physician. Likewise, I have never had second thoughts about my choice of profession and discipline. I still believe what I think I told those who interviewed me for medical school admission. I said that the practice of medicine is attractive to me because it uniquely melds the opportunity to be involved in real scientific inquiry with the privilege of providing practical and necessary service to those in need. What could be better? Even though my thinking has been broadened by opportunities to serve in other significant ways in more recent years, my gratitude for a career in medicine is in no way diminished.

During my professional years in medical education and now as I am back, quite unexpectedly, in the role of an educator, I have consciously tried to read about and study firsthand the characteristics of people who are successful in our profession and in others. I'll not try to describe the popular or frequent characteristics of purported automatic success that are familiar to you. There is one important attribute or trait that seems to me to be somewhat neglected, and yet is needed badly. Even for those who clearly have it, it seems to me that it is one of those rare qualities that is hard to overdo. I make this assertion, knowing that some who are listening only superficially may feel they have a strong point on which to quibble. They may, but I do not believe so.

The quality or trait that I have in mind is meekness. I, like most of you, didn't learn too much about meekness in medical school or residency training. While I know that I saw examples of wonderfully meek physicians, I don't recall them being recognized or rewarded on the basis of their meekness, except for the occasional observation by patients or colleagues that they were "nice people." Meek people are nice people, but I don't consider meek and nice to be synonyms.

Years ago, before I was called to the Seventy and long before my current assignment, I was invited to present a lecture to the Honors Program at Brigham Young University. Elders Maxwell, Oaks and Eyring also spoke

in that series and had something to do with the topic I was assigned to cover: "The Importance of Meekness in the Disciple-Scholar." Even then I knew that this assignment did not come because of any expertise or emulation that I personally could demonstrate, but likely rather because this was an attribute so obviously lacking in my limited armamentarium of cardinal virtues. While the assignment may not have changed my behavior as much as would be desired, it has influenced my thinking since that time.

Before I relate my concerns or suggestions to medicine specifically, let me share the enhanced understanding of the principle of meekness that largely grew from that BYU assignment more than a decade ago. As I read what I said then, I hope you will "liken" these definitional statements to yourselves and particularly to practitioners of medicine.

Webster defines meekness as a noun meaning patience and long-suffering. Associated ideas include self-control, calmness, tolerance, endurance of offenses, the capacity to bear pain or trials without complaint, and so forth. The Topical Guide and Index in recent editions of the LDS scriptures link meekness with words like contrite, gentle, humble, lowliness, poor, forbearance, and love. It should be noted that a common syntactical usage that may denote a deficiency in spirit or courage has no place in our meaning or discussion. Likewise, we should not be confused by supposing that by meek we mean timid, tentative, or vacillating.[1] These are still my operational definitions of the meekness phenomenon today and provide the basis for my observations and conclusions.

Early in my academic career, a friend shared with me a wonderful quote by Milton Mayer. I think it is relevant to my topic tonight, and I suspect your spouses will enjoy it:

"One of the things the average doctor doesn't have time to do is catch up with the things he didn't learn in school, and one of the things he didn't learn in school is the nature of human society, its purpose, its history, and its needs . [. . .] If medicine is necessarily a mystery to the average man, nearly everything else is necessarily a mystery to the average doctor."[2]

If my assertion about the lack of meekness training in medical education is true, then perhaps, according to Mayer, we should be expected not to understand meekness and be forgiven for not being meek in our demeanor. Because we all believe, as members of this society, that some of our most important education—indeed, the most important aspects of our mortal learning—is not related to medical school or house staff training, our most significant examinations by the Perfect Judge will ultimately not give us a pass on the standard of meekness.

If the Mayer observation is not sufficiently humbling, try this statement of Mignon McLaughlin: "My doctor is nice; every time I see him I'm ashamed of what I think of doctors in general."[3] Happily, in spite of our discomfort with the relative frequency of criticism we receive as doctors, I believe we still have a long way to go before we reach the current level of lawyer jokes.

Our most significant examinations by the Perfect Judge will ultimately not give us a pass on the standard of meekness.

Like all good humor, there is a thread of truth in both of the statements I have just read. I choose not to criticize or even spend time thinking about why it might be so that meekness is an all-too-rare characteristic among physicians. In fact, with many of you who I know well, I would make the case that you are examples of great meekness in all of the positive connotations of that word.

I would like to spend our time together considering ways that we might become meek, if we are not, and increase our meekness even if we are well above average on some yet-to-be-defined meekness scale.

Of all the apostles and prophets of this dispensation, perhaps Elder Neal A. Maxwell has spoken and written of meekness more than anyone else. I had the great privilege of knowing him well and being in his company and under his influence quite often, particularly in the last decade when he suffered with leukemia so valiantly. With all of his intellect, literary and verbal skills, he would rank among the most meek of any that I have personally known. I believe this is true because of an obvious native endowment of meekness, but he also worked consciously on being meek himself. This was never feigned, never postured, never affected. It was who he really was. He was the same "off stage" as he was in the public eye. Let me share with you some of his "one liners," as he used to call them, on meekness. As you listen, try to see any possible applications to medical practice generally and to our own conduct and behavior specifically.

He writes, "Our deficiencies of style usually reflect an underdeveloped Christian attribute, as when a chronically poor listener exhibits a lack of love or meekness. You and I are too quick to forgive ourselves in matters of style."[4] Even busy doctors need to listen carefully—both because it is good medical practice but also necessary Christian practice! Think about this observation as you reflect on

colleagues and the face you see in the mirror.

Likewise: "The more one sees of life, the more one understands why there is such a scriptural stress on submissiveness and meekness. The dangers flowing from an excess of ego are real and constant. Would that we first placed an ego-filtering screen over all our thoughts, words, and actions before they hurt others or embarrassed us. If we are steadily becoming more and more the man or woman of Christ, the filtering mesh in that ego screen will become finer; fewer things will slip through to harm."[5]

Most of us have learned to put our dictated response to the hostile or thoughtless letter in our desk drawers overnight before signing and sending it. Would that we could apply the same principle to our ego screens when we think of something clever, biting or even deserved to say to those who may appreciate us less than we feel justified. Let me share just one more Elder Maxwell observation that seems particularly germane to those of us in medicine:

"In few things is genuine meekness so essential as it is in opportunities and responsibilities in connection with power. As we ponder the experiences of followership and leadership in the Church [and I might add in medical care], certain lessons emerge. In one way or another, each of these lessons turns upon the meekness factor. If we in our leadership assignments take upon us the yoke of Jesus, we soon begin to learn of Jesus as a result of those leadership experiences. Appreciation of Christ then deepens into adoration."[6]

"In few things is genuine meekness so essential as it is in opportunities and responsibilities in connection with power."

As Latter-day Saint physicians who happily accept the Savior as the greatest physician, how can we resist the need not only to appreciate and adore Him, but also to do our very best to emulate Him in all that we do in our much more limited capacities to help and heal the sick and afflicted?

Because it could be offensive, or at least unwise, to celebrate publicly the laudatory and exemplary meekness of many faithful LDS physicians who do what they do for the right reasons and appropriately avoid the limelight, I'll only identify some of you by illustrative, but by no means comprehensive, categories. It is necessary to applaud, with great commendation and appreciation, the very large numbers who do, and have done, so much.

I think of the many who have accepted missionary calls to go throughout the world to provide medical services to our missionaries. Many, if not most, have lived in conditions far below those at home and have had few, if any, of the advantages and support that they experienced in their own practices. Most have had to learn about diseases or problems that were not part of their specialty training or practices. All have had their compensation eliminated, or at least changed. President Faust described it as being "out of this world," meaning that there is no compensation, beyond the satisfactions of service, for the wonderful work that has been done.

I think of the many who have joined with other compassionate individuals or organizations, including this one, and have again gone to the far corners of the developing world, at their own expense, to provide services or procedures not otherwise available to the grateful, impoverished people they meet.

I think of the very many of you who quietly perform physical examinations for Boy Scouts and prospective missionaries without billing them or their families.

As I go about the Church on stake conference assignments, as I still do, I am constantly impressed with the large numbers of busy physicians and other health professionals who serve splendidly in stake presidencies, bishoprics and other key positions of responsibility.

As I follow those called as mission and temple presidents, visitor center directors and to other full-time assignments, I'm gratified with the number of dedicated, accomplished doctors who respond immediately and without question to the call of the prophet.

I could go on and add to the list by mentioning public and community service, philanthropy and other substantive contributions. I suppose in some rare situations one might make the case that all of these activities and contributions are meeting the needs of the physician, rather than those who are being served. I have considered this, but submit that in the vast majority of cases, service is rendered with meekness and because of meekness, not out of selfishness.

While you know what the Savior had to say about meekness, it seems worthwhile to me to review, in the context of the opportunities and responsibilities of the medical profession, some of His key pronouncements.

First, from the Beatitudes: "Blessed are the meek: for they shall inherit the earth."[7] What does this mean to us? I know that it is not immediate financial return because all of those I have just mentioned found their meekness and service to be very expensive in terms of what they might have earned had they stayed strictly in practice. I believe that it might be viewed in the same context of those who are faithful to the oath and covenant of the priesthood and

are promised that "all that my Father hath shall be given unto [them]."[8]

Think of this promise from Psalms: "The meek will he guide in judgment: and the meek will he teach his way."[9] I had thought that perhaps special physicians are meek because they have good judgment. Perhaps one of the blessings of trying to be genuinely meek is that one's judgment is enhanced by Him whose judgment is perfect.

Another, even more significant blessing promised in Psalms is that God will arise to save all the meek of the earth.[10] If one needs to really be meek to really be saved, then it is more understandable that there will not be any left but the meek to inherit the earth at that special future time.

That also makes it clear that Jesus, who never made gratuitous comments, could say with special clarity and urgency, "Take my yoke upon you, and learn of me: for I am meek and lowly of heart: and ye shall find rest unto your souls."[11] Not only do we understand the necessity of being meek to obtain the eventual, real rest that we desire, but we also then can come to a better understanding of why those without meekness often seem so very miserable.

One of the blessings of trying to be genuinely meek is that one's judgment is enhanced by Him whose judgment is perfect.

I believe we all know the special statement of King Benjamin who testified that he had obtained his message from an angel[12] who, in turn, was representing the Lord:[13]

"For the natural man is an enemy to God, and has been from the fall of Adam, and will be, forever and ever, unless he yields to the enticings of the Holy Spirit, and putteth off the natural man and becometh a saint through the atonement of Christ the Lord, and becometh as a child, submissive, meek, humble, patient, full of love, willing to submit to all things which the Lord seeth fit to inflict upon him, even as a child doth submit to his father."[14]

Meekness is included with this list of necessary and impressive virtues that are required for us to become what is expected of us. I don't know for certain about you, but I suspect you would agree that there is much in medicine which is tempting, if not downright encouraging, for strengthening the natural man in all of us.

While all of these cardinal characteristics are vital, I would submit that meekness is an important anecdote to all that sustains the natural man in us. Elder Maxwell put it this way:

"Meekness is a facilitator in the development of all the other Christian virtues. Combined with the other virtues, it supplies human needs, including perspective. After cataloging various qualities, such as faith, knowledge, temperance, patience, godliness, kindness, and charity, Peter declared that if an individual lacks these qualities, he will not be able to 'see afar off' (2 Pet. 1:5-9). Determining whether we will live myopically and selfishly or live now for eternity is a fundamental decision that colors every day of daily life. To live a life of 'thanksgiving daily' (Alma 34:38) while in the midst of adversity and its tutorials is impossible without a degree of meekness."[6(p4)]

I would not go so far as to suggest that without meekness one cannot have other significant virtues. I would suggest that with true and genuine meekness, the other virtues are more apt to be welcome and comfortable in our presence.

If President Hinckley were with us tonight, he would likely be very uncomfortable with what I will now say. Not because it is untrue or inappropriate, but because he is truly a meek man. He is fearless and can be fearsome, but as you watch him during conference in the days ahead, notice his personal modesty and deflection of aggrandizement. This, in my judgment, is quite remarkable when you know how confident he is in the Lord's work and the mission of this Church. One of his favorite scriptures is that familiar verse from *Doctrine and Covenants* Section 112: "Be thou humble; and the Lord thy God shall lead thee by the hand, and give thee answer to thy prayers."[15] He is a living example who believes this and practices this counsel himself.

I don't know that I have ever heard President Hinckley say out loud, "Thus saith the Lord!" I have heard him on many occasions say, "I think we should . . . ." What is amazing to me is that when this happens, I see all of the other Brethren sit up a little taller and listen a little more carefully, knowing that the Lord's oracle is speaking. Think of the way he announced the rebuilding of the Nauvoo Temple or the 100 new temples or the Perpetual Education Fund or any of the remarkable undertakings and accomplishments of the last decade that he has presided over the Church.

On at least three occasions I have been in his office when he has given me new, unexpected and heavy responsibilities. Even with the great assignment that I currently have, the charge was given in this way: "We would like you to be the president of BYU, and it will be a wonderful experience." On every occasion, he is unfailingly kind, generous in his thanks and praise, and encouraging and confident about the future. I have never had a personal

experience with either Moses or Enoch, although I am aware of the scriptural descriptions of their meekness.[16] Yet, I am a witness of President Hinckley's meekness and his wonderful impact on all with whom he interacts.

How do we best become more meek? For me, this is more than a theoretical or philosophical question. I know by experience that it does not just happen. Like all of the other virtues, it requires "study, work and prayer." In some respects, meekness is the antithesis to pride but is similar in one respect. That is, those who are sure that they are free of pride in reality often have more than a generous portion of pride. Conversely, but similarly, those who are satisfied with their purported high level of meekness are almost universally deficient in this essential characteristic.

Like working out physically, or becoming proficient in a procedure or other process, the secret is usually in the conscious, repetitious effort to do and be better. Likewise, while it is never a good idea to be too self-centered, developing genuine meekness does require the ability to be accurately self-aware. Since my youth, I have been a fan of the Scottish poet, Robert Burns. Some of you are much better with your real or feigned Scottish accents and I will spare you my own very poor imitation. I will, however, translate into 21st-century Utah English a favorite phrase in Burns' "To a Louse": "Oh what a gift to give us, to see ourselves as others see us."

One who is meek understands, and accounts for, his or her effect on other people. The truly meek person is able to feel the importance and needs of others genuinely and usually transmits this understanding by how he or she acts, rather than just by what might be said—important as verbal communication is. Likewise, it is the consistent effort, pursued quietly, consistently and seriously, that leads to success in becoming more meek (just as it is with most other accomplished strengths).

A wonderful stanza, from a much longer Henry Wadsworth Longfellow poem entitled "The Ladder of St. Augustine," was frequently quoted by President N. Eldon Tanner and also has been used often by President Kimball, President Monson and several others. I believe it applies to our efforts to become more meek and, as a result, more proximate to the kind of physician the Greatest Physician was and is.

"The heights by great men reached and kept
Were not attained by sudden flight,
But they, while their companions slept,
Were toiling upward in the night."

I suppose that the scriptural phrase "line upon line, precept upon precept"[17] applies not only to the reception of revelation and inspiration, but also to the learning necessary for us all to acquire as we aspire to become saints or friends of God and leave the "natural man" or "woman" behind us. Because we are commanded to become more meek, we know that it is more than a dream or distant theoretical goal; we have been assured that "with God all things are possible."[18] Therefore, the privilege—and responsibility—is with all of us to become more meek.

> There is much in medicine which is tempting, if not downright encouraging, for strengthening the natural man in all of us.

I conclude with this remarkable statement made by the Prophet Joseph concerning his brother, Hyrum. "I could pray in my heart that all my brethren were like unto my beloved brother Hyrum, who possesses the mildness of a lamb, and the integrity of a Job, and in short, the meekness and humility of Christ; and I love him with that love that is stronger than death, for I never had occasion to rebuke him, nor he me."[19]

Wouldn't it be something if our siblings could say of us as did Joseph of Hyrum? Wouldn't it be wonderful if our patients, our colleagues and particularly our families could feel about us the way that Joseph felt about Hyrum? I think if that were true, we could really feel that we had, in fact, inherited the earth and become clearly meek.

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REFERENCES

1 See Eyring HB, ed. *Learning in the Light of Faith*. Salt Lake City, Ut: Bookcraft; 1999:36.
2 Mayer M. In: *Peter's Quotations*. 327.
3 McLaughlin M. In: *Peter's Quotations*. 326.
4 Maxwell NA. Repentance. *Ensign.* November 1991:30.
5 Maxwell NA. *Lord, Increase Our Faith*. Bookcraft; 1994:48.
6 Maxwell NA. *Meek and Lowly*. Deseret Book; 1987:17.
7 Matthew 5:5.
8 *Doctrine and Covenants* 84:38.
9 Psalms 25:9.
10 See Psalm 76:9.
11 Matthew 11:29.
12 Mosiah 3:2.
13 Mosiah 3:4.
14 Mosiah 3:19.
15 *Doctrine and Covenants* 112:10.
16 See Numbers 12:3; Moses 6 & 7.
17 2 Nephi 28:30; *Doctrine and Covenants* 98:12; *Doctrine and Covenants* 128:21.
18 Matthew 19:26.
19 DHC 2:338.