BOOKS & ARTS

ALUMNAE ASSOC. ROYAL VICTORIA HOSPITAL TRAINING SCHOOL FOR NURSES

Architectural healing

A detailed history explores the symbiosis of modern scientific medicine and hospital design.

Medicine by Design: The Architect and the Modern Hospital, 1893–1943
by AnnMarie Adams
University of Minnesota Press: 2008. 240 pp. $82.50

D. Kirk Hamilton

The twentieth century saw the beginnings of modern scientific medicine and a shift in hospital architecture. Did good design catalyse medical progress during this period, or did medical practice dictate what was built?

AnnMarie Adams's careful and delightful book analyses hospital design between the late-Victorian scientific revolution of the 1890s and the Second World War. Adams, an architectural historian at McGill University in Montreal, uses the city's Royal Victoria Hospital (pictured) as her centre-piece. Around it she weaves carefully researched stories of other hospitals, architects, physicians and governors involved in the development of North American hospitals.

Adams questions the assumption held by medical and architectural historians that hospitals passively reflect evolving practice and innovation in medicine. She explores how physicians and architects worked together to invent the modern hospital. As hospital architects learned more about medicine, they began to offer practical and innovative solutions, as in the case of lighting for operating theatres and choice of materials that support hygiene. At the same time, some physicians acted as consultants on multiple design projects and lectured at conventions on design topics.

Medicine by Design contends that inter-war hospital architecture "anticipated and produced medical practices that were broadly and socially conceived". Service to the poor at a time when few effective cures were available was replaced by a mission to treat the sick as medicine improved. Hospital buildings began to reflect social strata with separate facilities for the wealthy on upper floors. The evolving professional status of nurses brought nursing schools, and with it, highly regulated, supervised dormitory housing shaped by paternalistic concerns for young unmarried women leaving the protection of the traditional home.

Between the wars, hospital architects began to separate the functional planning of a building from its aesthetic design. Adams notes that hospitals were slow to adopt the unornamented style of modern architecture so popular in the 1920s and 1930s, favouring Georgian or neo-classical aesthetic. Well-ventilated pavilions, developed while medicine was dominated by the 'miasma' theory, gave way to block planning as Louis Pasteur's germ theory advanced. The latter provided more segregated spaces and greater distances from open windows, and allowed physicians to control airflow and cleanliness.

As surgeons made the transition from gentlemen's attire to gloves, masks and gowns, and used Joseph Lister's carbolic acid spray on wounds, architects designed new operating theatres with abundant natural and artificial light, space for new equipment, and resilient surfaces that could be cleaned with harsh chemicals. The prevailing 30-bed wards were replaced by separate rooms of two to eight beds each, arranged along both sides of a central corridor. These rooms and spaces for large machines such as Wilhelm Röntgen's X-ray apparatus or for elaborate hydrotherapy were better suited to buildings with a broader beam span than the typical pavilion.

Adams begins her story with the 1893 opening of the Royal Victoria Hospital, a tribute to Queen Victoria's golden jubilee in 1887 conceived by local civic leaders and physicians with Scottish links — at the time many North American physicians were trained in Edinburgh. British architect Henry Saxon Snell's hospital design drew on the style of a Scottish baronial manor.

Using a wide variety of original sources, Adams describes the evolution of the Royal Vic and other North American hospitals through a succession of projects by prominent and lesser known architects. The Royal Vic and the Johns Hopkins Hospital in Baltimore, Maryland, completed five years earlier, were the first in North America to reflect the new thinking associated with the scientific revolution while still adhering to pavilion-style plans. Physician John Shaw Billings designed Johns Hopkins in collaboration with architects John Niernsee and Cabot & Chandler after touring many of the best European hospitals. Pavilions had become the prevailing design there following the competition to rebuild the Hôtel-Dieu in Paris after the disastrous fire of 1772. Florence Nightingale supported pavilions, advocating hospital wards with large windows between every two beds, but criticized the design of the Royal Vic, where she felt that nurses on the wards would struggle to observe their patients efficiently.

Adams explores the important contribution of Edward Stevens, arguably the first specialist architect of hospitals. Stevens trained at Massachusetts Institute of Technology and made rigorous studies of European and North American hospitals and the practice of medicine. He designed, with Frederick Lee, numerous hospitals across the United States and Canada and wrote the influential guide *The American Hospital of the Twentieth Century* in 1918. Also influential were physician consultants such as S. S. Goldwater, the superintendent of New York Hospital. Goldwater proposed a design in 1905 for an urban high-rise hospital exploiting the new technologies of structural steel, elevators and electric lights. Although never built, the proposal was quickly followed by numerous designs for such multi-storey hospitals.

With medicine progressing ever faster, Adams' history reminds us why hospital architects and physicians should work together to optimize healthcare environments. ■

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Quest for extraterrestrial life

The Living Cosmos: Our Search for Life in the Universe
by Chris Impey
Random House: 2007. 416 pp. $27.95

Bruce Jakosky

From only one example, that of life on Earth, we have learned a lot about what makes a planet habitable. We know how life functions, how it may have originated and some types of environment that support its existence. Yet we do not know how widespread life might be. To do so we must extend our knowledge past Earth, into the Solar System and beyond.

The possible existence of extraterrestrial life — be it in the form of microbes on Mars, biological forms on planets orbiting other stars, or, frankly, UFOs and aliens visiting Earth — is fascinating. Yet astrobiology is firmly science-based rather than speculative and aimed at a curious public. Its major questions can be answered empirically with appropriate spacecraft and telescopes. To elucidate the origins of life, we might ask for example, is Mars habitable? Can signs of life be found there or on moons such as Jupiter's Europa and Saturn's Titan? Are there Earth-like planets with environments conducive to life around other stars? Might there be civilizations elsewhere in our Galaxy? If so, could we listen in on their conversations?

These questions run through *The Living Cosmos*. Astronomer Chris Impey provides a broad, accessible context for his thoughtful, engaging and up-to-date take on the quest for extraterrestrial life. The start and the end of the book pose questions about the relationship between art and science, and the likelihood of extraterrestrials having either. The rest dwells mainly on the science. Starting with the historic foundations of the field during the copernican revolution and following the story through modern science's development, key chapters deal with the origins of life, life in extreme environments and evolution here on Earth. The story then moves out into the Solar System and planets around stars other than our Sun. A far-reaching final chapter tackles intelligent life, interstellar travel, and the meaning of the search for life. Impey details current and future space missions and extrasolar planet research.

How is this exploration progressing and what lies ahead? Mars is arguably the best place to look for present or past life, given the evidence for liquid water there and the planet's proximity to Earth. Although many spacecraft have been sent, the future of the programmes is uncertain. Five craft currently send back data: the exploratory robot rovers Opportunity and Spirit from its surface, and orbiters Mars Odyssey, Mars Reconnaissance and Mars Express. In the United States, the next missions are over budget or delayed, notably the Mars Science Laboratory (scheduled for a 2009 launch) and the Mars Scout orbiter (now scheduled to launch in 2013). Despite repeated calls for a Mars Sample Return, plans for that or other missions beyond 2013 are unclear, especially in light of the recently released proposed budget for next year.

Beyond Mars, several moons in the outer Solar System are worth exploring. Jupiter's satellites Europa, Ganymede and Callisto are good targets because they may have recently hosted liquid water. Saturn's moons Titan and Enceladus, targets of the ongoing Cassini mission, are of great interest because of the abundance of organic molecules (especially on Titan) and the potential for near-surface liquid water (Enceladus). NASA is studying possible missions to these objects as a prelude to a major push mission into the outer Solar System.

To explore these remote places and perform science there, we need new technologies. Returning a sample of martian rocks and soil involves lifting the matter off Mars' surface, sealed tightly enough to avoid releasing any captured organisms into the terrestrial environment, and then flying the capsule back to Earth. Spacecraft must survive harsh radiation fields around the giant planets and perform difficult manoeuvres deep within their gravitational wells to orbit or land on a satellite.

These problems are solvable. But in our tight-budgeted times, technology development is often of lower priority than maintaining ongoing missions and starting new ones. Ironically, having the new technology in hand at the start of mission development helps prevent budget overruns later on. It is shortsighted to skimp on innovation. We pay the costs later, possibly in axed missions.

Recently, insufficient funding has postponed key astrobiology missions such as Terrestrial Planet Finder and Mars Sample Return. NASA and the science community must work together to address cost overruns and optimize research within the funding available. Once we have a viable plan of action, we will be able to answer the questions that Impey has ably outlined, and continue the search for life elsewhere. ■

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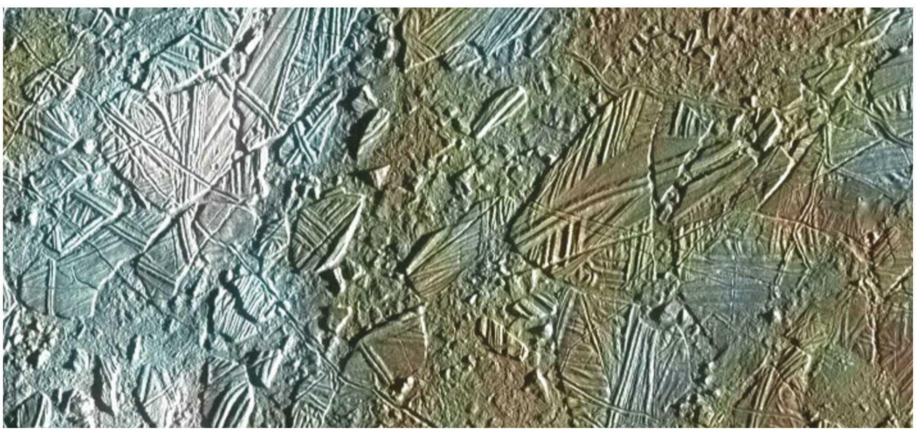

NASA

The icy surface of Jupiter's moon Europa may recently have hosted water: could it support life?