The author—pictured above in about 1990 in the clinical laboratory at Lancaster, N.H.'s Weeks Memorial Hospital—reflects in this article on his nearly 40 years of pathology practice in the North Country. The grave rubbing on the wall behind him is his own handiwork—it came from a gravestone in a cemetery in Norwich, Vt.

Pioneer in Pathology

By Robert W. Christie, M.D.

Half a century ago, few specialists practiced in the northern reaches of New Hampshire and Vermont. The first pathologist to settle north of Hanover shares the story of his colorful career.

Everyone's career contains a few events that are seemingly inconsequential at the time but that—in retrospect—strongly influence its course. Two such moments stand out for me: an opportunity to join an expedition to Greenland and a chance meeting in an elevator in Memphis.

But first let me back up a little. After WWII service as a tank company officer, college, medical school, a year's internship at Dartmouth, and three years in general practice in Northfield, Vt., I decided to do further training in pathology at Dartmouth. I found it demeaning to start all over as a resident—though technically my position was a fellowship—after having been out in practice on my own. But I swallowed my pride and began at the bottom once again.

My monthly fellowship stipend of $150 was a tremendous improvement over my intern's income of $10 per month (less $7.20 for Blue Cross, which left me with a net of $2.80 for a whole month's incidentals). But it was a far cry from my practice's $5,000 gross earnings the year before—paltry by today's standards, but a decent living then.

We pathology residents learned by the mentorship method. The chief of pathology—Dr. Ralph Miller, whom we called (behind his back) "The Chief"—was our primary mentor. The duties of the junior residents included spending mornings doing "outside surgicals" and "inside surgicals." The "outsides"—specimens from outlying hospitals throughout the region—came in via mail or courier. They arrived in various states of preservation in plastic bags, jelly glasses, pails, or cardboard cartons that were often leaking and reeking of formaldehyde. The specimens ranged from minute skin biopsies and other tissue samples to entire limbs or stomachs or colons, including their contents. Our job was to process these "gross specimens" (indeed, they often could be called exactly that) by describing their appearance, size, odor, weight, and other salient characteristics. Processing the "inside surgicals," the daily gleanings from Mary Hitchcock's own ORs and various Hitchcock Clinic offices, was a lot less challenging and was considered a less onerous exercise.

Our afternoons were spent "reading surgicals" with Dr. Miller or another member of the department's staff. "Reading" involved reviewing the microscopic slides that had been prepared from the previous day's outside and inside gross specimens. Sitting at a microscope next to a staff member, the resident would present a diagnosis on each of 20 to 40 cases—offering up a conclusion for discussion, confirmation, criticism, or instruction. The staff pathologist would then dictate a description and a definitive diagnosis for the final report.

The residents also performed autopsies almost daily, under the supervision of one of the staff pathologists. Mary Hitchcock had one of the country's highest autopsy rates for patients who had died in the hospital (most years it was above 90%). This was a matter of pride, because a hospital's autopsy rate was considered by the Joint Commission on the Accreditation of Hos-

Christie was the first specialist in pathology to practice in the North Country of New Hampshire and Vermont. He did his internship (in 1951-52) and a fellowship in pathology (from 1955 to 1957) at Dartmouth and for many years was an adjunct professor of pathology at DMS. He earned his M.D. at the State University of New York College of Medicine in New York City.

Christie did his internship—as well as subsequent training in pathology—at Dartmouth. He is pictured above, in the back row on the far right, with his 1951-52 internship class. That group included an early (though not the very first) woman intern at Dartmouth, Janet Ordway; later, one of his contemporaries in the pathology program was the very first woman pathology resident, Elizabeth French.

As we worked, Dr. Miller would occasionally appear at the table and ask searching questions of the residents or make acerbic comments on their technique. He disdained sloppy incisions and inept organ removal.

pitals as an important indicator of the quality of both patient care and housestaff training.

The residents took turns as prosector—as the autopsy surgeon, that is. That person would make the incisions, dictate observations, and remove the organs according to a time-honored protocol initiated about a century before by the German "Father of Pathology," Rudolf Virchow. Being the prosector also involved reviewing the decedent's medical record and putting the autopsy report together for criticism by the staff pathologists. Writing autopsy reports was a time-consuming task and a lower priority than processing surgical specimens—which, after all, had come from a still-live patient—and so they often stacked up in the residents' in-boxes. But they always got finished eventually, because getting credit for your residency was dependent on their completion.

Autopsy rooms were casual places in those days. We simply rolled up our sleeves and donned rubber gloves and aprons over our street clothes—a far cry from the head-to-toe covering that is mandatory in a modern autopsy suite. As we worked, Dr. Miller would occasionally appear at the table and ask searching questions of the residents or make acerbic comments on their technique. He was even known to pick up organs or reach into a body cavity bare-handed. He disdained sloppy incisions and inept organ removal. He was said to have once left a New Year's Eve party in his tuxedo to perform an autopsy and later returned to the party without having spattered a drop of blood on his snowy-white, stud-fronted shirt.

One of the residents served as scribe, while the rest dissected the organs and harvested samples for later microscopic observation. Various autopsy misadventures (some perhaps apocryphal) entered the folklore of the department, including an episode when an entire intestinal tract slipped through a resident's hands and disappeared down the drain—all 26 feet of it. Back then, the town's sewage was piped straight into the Connecticut River, and the missing organs were later discovered floating on the river by some startled canoeists. They alerted the Hanover police to a suspected homicide and dismemberment, but luckily the investigation didn't get far before a connection was made to the autopsy-room mishap. A lab examination confirmed that they were indeed the missing intestines.

When a resident had achieved sufficient capability in performing autopsies unassisted, usually by the end of the first of four residency years, he or she was assigned to the roster for "outside" autopsies. (I use "or she" because Hitchcock had its first woman resident in pathology during my time there—Elizabeth French, later the first woman member of the Hitchcock Clinic.) Doing outside autopsies involved taking the "company car" and sallying out over hill and dale. The destination was usually an outlying hospital or funeral parlor, where conditions for performing the procedure were often far from ideal. The necessary instruments were carried in a metal carpenter's toolbox, along with a jar of formalin to hold organ samples from which microscopic slides would later be prepared.

Hours later, the resident would return with a messy toolbox; a couple of sheets of blood-spattered notes on organ sizes and weights and observed lesions; and a wide-mouthed canning jar filled with formaldehyde and pieces of the decedent's major organs.

In the course of this work I made the acquaintance of many funeral directors; some of them were friendly and helpful and others were downright hostile. I learned to be pleasant, cooperative, responsive to the undertaker's demands and admonitions, and scrupulously tidy in my autopsy performance—lessons that would prove to be very helpful in years to come.

On rare occasions, when an outside autopsy was forensic in nature—that is, part of a legal proceeding—one of the pathology staff members would accompany the resident. I recall one such occasion when Dr. Philip Nice and I autopsied an elderly farmer who had met a sudden demise in his cow

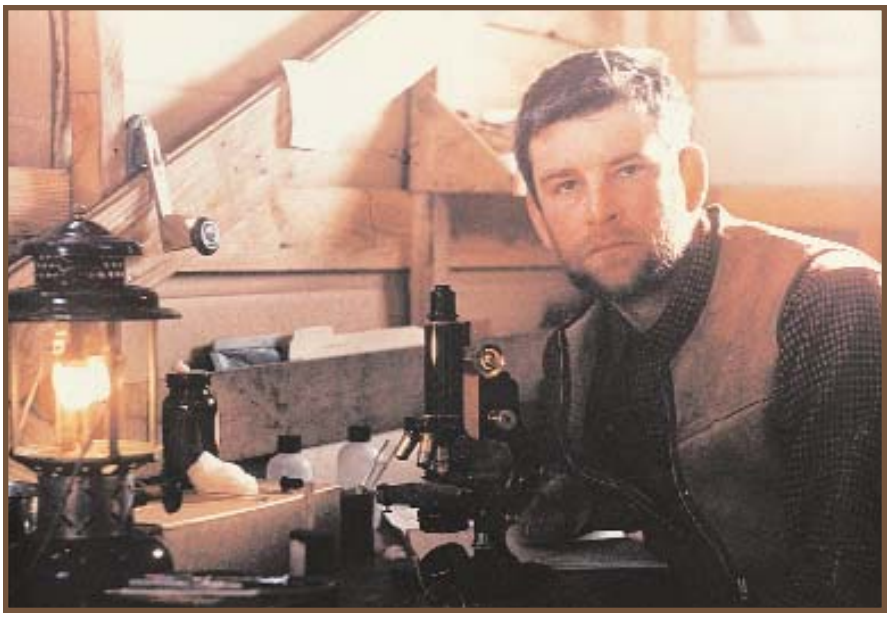
barn. Because he had been unattended by a physician, state law required an autopsy to rule out foul play. We did the prosection with the body lying on a couple of boards supported by sawhorses outside the old barn. The decedent's middle-aged son stood by, gawking and commenting on the proceedings. "That's sure smaller than a cow's heart!" I recall him saying. "What's his liver look like, Doc?" the son asked a little later. "He used to drink a lot." This work was a wonderful introduction to the northern New England populace.

During the first year of my pathology residency, Dr. Miller called me aside one day and told me that the Snow, Ice, and Permafrost Establishment was looking for a doctor to be the medical officer for a five-month expedition to unexplored portions of the Greenland ice cap. Because of my time in general practice, he thought I might want to think about the opportunity. This was the first career-defining moment mentioned above; among other things, it led to writing being a lifelong avocation.

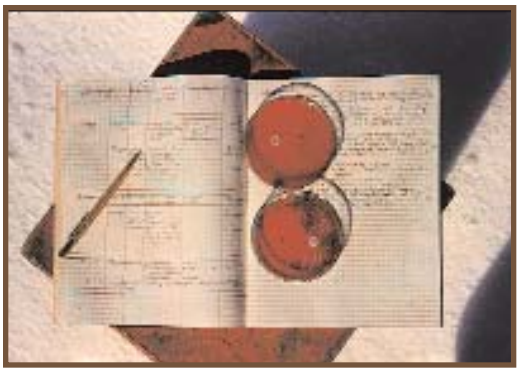
I told him that I'd consider it if he would give me residency credit for the time away. The eventual bargain was that if I produced "creditable research" while on the expedition, I'd get credit.

Thus stimulated, I conducted several studies and observations that led to the publication of two papers in the *New England Journal of Medicine* (one, "Arctic Anemia," was the lead article; the other was about changes in the nasopharyngeal and skin bacteria in isolated scientists). A third report from that trip was published in the *Journal of the American Medical Association* ("Medical Notes on a Greenland Ice Cap Expedition"). The *JAMA* article included, among other things, the first published report of influenza being spread through an air drop of supplies to the members of an expedition who had been isolated from all outside contact for many weeks.

That experience led, on the conclusion of my residency, to a year of experimental pathology at the Brookhaven National Laboratory (and a few more publications), and this in turn was a springboard to a senior residency in clinical pathology at the Clinical Center of the National Institutes of Health. Dr. George Williams, the director of the NIH's Clinical Laboratories, was good friends with Dr. Lall Montgomery, who at the time was president of the American Society of Clinical Pathologists as well as head of pathology at Ball Memorial Hospital in Muncie, Ind. That connection landed me a job as an associate pathologist at Ball Hospital, where I soon realized that I was being groomed to take over from Dr. Montgomery when he retired.



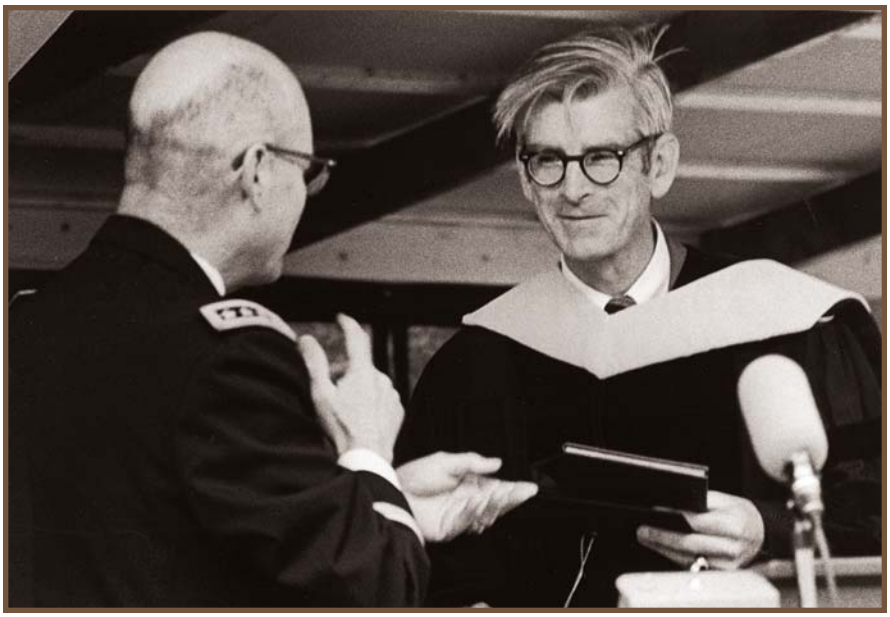
Christie spent five months with an expedition to Greenland during his pathology fellowship. He is pictured above in one of the expedition's four wanigans doing research by Coleman lantern. Below are his field notebook and blood agar plates from one of his studies there; he incubated the petri dishes using his own body heat, placing them in the pockets of a vest his wife had designed for that purpose.



In Greenland, I conducted studies that led to the publication of two papers in the New England Journal of Medicine (one, "Arctic Anemia," was the lead article; the other was about bacterial changes in isolated scientists).

But then—here's the second career-defining event—a serendipitous meeting in an elevator led me back east. At a medical conference, I ran into an acquaintance who was a senior resident in pathology at the University of Vermont. He said he'd just accepted a position at a hospital in Colorado Springs, choosing it over an offer to serve three small, rural hospitals in northern New Hampshire and Vermont.

The conversation titillated my imagination. I loved—and sorely missed—that part of the world. I wasn't unhappy in Indiana. The Ball Hospital pathology lab was well designed and well run. Dr. Montgomery had trained at the Mayo Clinic (as had several of the founders and early members of the Hitchcock Clinic, Dr. Miller included). The salary was good. I lived with my wife and three—going on four—young children in a comfortable



In 1972, Christie received an honorary doctor of science from his undergraduate alma mater, Norwich University, for his services to humanity, science, his country, and his alma mater. He is pictured above receiving the degree from Major General Barksdale Hamlett, Norwich University's president. Christie serves as the secretary for both his Norwich University class and the housestaff alumni of Dartmouth.

When I arrived, the labs had only rudimentary facilities. Bunsen burners, Folin-Wu tubes, Erlenmeyer flasks, Fehling's solution, hemocytometers, and ancient, encrusted microscopes were all we had to work with.

house close to the hospital. I found most Hoosiers friendly. But Indiana was flat and I missed northern New England, where I had gone to college, done my internship and residency, and practiced for several years. I had heard the call of the wild.

I made a quick interview trip to the three hospitals—Littleton, N.H., Hospital; Weeks Memorial Hospital in Lancaster, N.H.; and Brightlook Hospital in St. Johnsbury, Vt.—which on the map made a triangle approximately 25 miles on a side. I left with a signed contract to provide pathology services to all three, none of which had had a pathologist *in situ* before. (Before my arrival, Dr. Miller had contracted to provide pathology services from Hanover to these hospitals and many others throughout New Hampshire and Vermont. This service was largely rendered by the pathology residents.) The deal came with a guarantee of $20,000 for one year—less than half of what I was earning in Muncie—and after that I'd be on my own as an independent contractor.

I was to start on July 1, 1961. In spite of the fact that I had to take my board certification exams in anatomical and clinical pathology in June, that our fourth child had been born just five weeks earlier, and that the whole family (including a large dog and two gerbils) had to move into a house in Lancaster that my wife had yet to see, we arrived in time for me to start work on the day the contract stipulated. And small towns in New Hampshire being what they are, our neighbors helped us survive the first month while we waited for the arrival of our furniture.

With the enthusiasm of youth and inexperience, I waded into my new practice. Dr. Montgomery had taught me the rudiments of negotiating contracts with hospitals, which proved helpful.

My location in Lancaster turned out to be fortuitous, because its centrality positioned me to easily serve hospitals in both northern New Hampshire and northeastern Vermont. Over the next several years, as word spread that a full-time pathologist was practicing in the region, five other hospitals asked me to come on as a consultant. Eventually this led to medical staff membership and assignment as attending pathologist and clinical laboratory director in eight hospitals: the original three, plus St. Louis Hospital in Berlin, N.H. ("Hôpital Saint Louis," staffed by an order of French-speaking Gray Nuns originally from Canada); Morrison Hospital in Whitefield, N.H. (now a nursing home); Cottage Hospital in Woodsville, N.H.; Upper Connecticut Valley Hospital in Colebrook, N.H.; and North Country Hospital in Newport, Vt.

But challenges loomed large from the very beginning. The three hospitals' laboratories had only rudimentary facilities and minimal (though loyal) staffs. Fortunately, two of the three labs included a medical technologist certified by the American Society of Clinical Pathology, and the Weeks Hospital had just employed a crusty but experienced and dependable Englishman who had supervised a laboratory in the British Army. Bunsen burners, Folin-Wu tubes, Erlenmeyer flasks, Fehling's solution, hemocytometers, and ancient, encrusted, and barely operative microscopes were all we had to work with. The first goal was to upgrade the equipment and improve the facilities. The second was to find competent technologists.

When I had been at the NIH, I had learned to use and appreciate a state-of-the-art armamentarium in a modern clinical laboratory. I wanted as much as possible to bring these labs up to that standard. My belief was that patients and physicians in small rural hospitals deserved the same high quality of laboratory services that were available in big referral hospitals. I recognized that the variety of services might be limited, but I believed the quality should be at the highest level for any tests that a laboratory undertook. Those services that could not be provided competently would be referred out to a lab that could do them well. This led to my reconnection with Dartmouth, when I contacted my former mentors and arranged to send some speci-

mens to Hanover. Consequently, the range of lab services in my hospitals expanded greatly.

Automation of laboratory tests was in its infancy in the 1950s, but prototype instruments were available for doing some chemistry and hematology tests. The three original hospitals' budgets obviated acquisition of these instruments, so I donated an early model of one to each hospital. Soon, the enhanced quality and speed were evident to the medical staffs and administrators. As a result, more tests were ordered, since the information was more reliable and the turn-around time now short enough to make the results useful.

Lab revenue moved upward—gradually at first, then more rapidly. But this put a strain on the small staffs of the labs. Repeated attempts to recruit trained technologists to small rural hospitals with low pay scales proved futile, so I decided to grow my own by establishing a laboratory technology school. I'd had some experience teaching recruits during World War II, so the prospect was not daunting. With the help of a couple of state agencies, I established the Northern New England School for Certified Laboratory Assistants (NNESCLA) and got the program certified by the American Medical Association. Local high school graduates applied for admission and upon completion of the program were eligible for the AMA certifying exam. I, and other pathologists who eventually joined me in practice, were the school's instructors, with the able assistance of the hospitals' experienced technologists. Our graduates easily found employment, greatly mitigating our staffing problems.

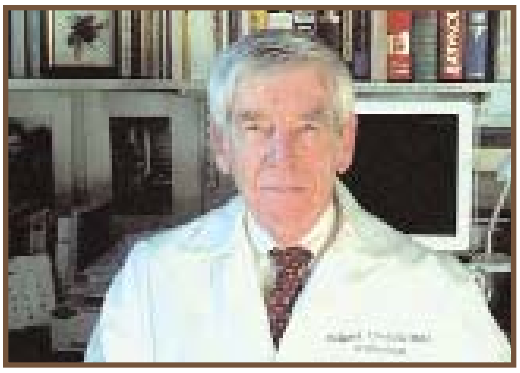
Lab technology was not the only fertile ground for planting educational seeds. It was soon apparent that the local physicians (mostly general practitioners) did not appreciate the value of lab tests. Many were older, and they had not kept abreast of lab-related advances in diagnosis. In Muncie, I had been a regular attendee at monthly meetings of the Muncie Academy of Medicine, which featured dinner and an after-dinner medical program. I decided to form the Northern New England Academy of Medicine.

Given the numbers, it was clear that a single monthly gathering would serve the staffs of all three hospitals. But to my surprise, I discovered that the doctors in the three nearby towns hardly knew each other, and that those they did know they distrusted. They would never send a patient to a colleague for a second opinion, much less refer among themselves, for fear of losing a patient to a rival physician. Competition for patients was serious.

To be sure this new effort at collegiality got off the ground, I took responsibility for organizing the meetings and appointed myself president (a position that was never challenged). Each month a postcard, noting a meeting place at a local eatery and a short agenda, was sent to every medical staff member at the three hospitals. The offerings included free drinks, a Dutch treat dinner, and a program of several short presentations—about intriguing surgical or autopsy cases, interesting or enigmatic radiology results, or case reports involving the use of laboratory tests in diagnosis.

The academy was an overwhelming success. Having no structure, no officers except me, no committees, and no responsibilities other than coming to one meeting a month brought about the hoped-for effect. Attendees were encouraged to discuss anecdotes and problems from their practices, which they began to do with enthusiasm. I started to get calls from physicians asking me to include

In the early 1980s, Christie was willing to be photographed (in the pathology lab at Androscoggin Hospital in Berlin, N.H.—he's the one in the center in shirtsleeves) for the advertisement above touting the use of DuPont automated analyzers in small hospitals, but he felt it was unprofessional for his name to be used in print. The photograph below was taken in 1998, at the time of his retirement.



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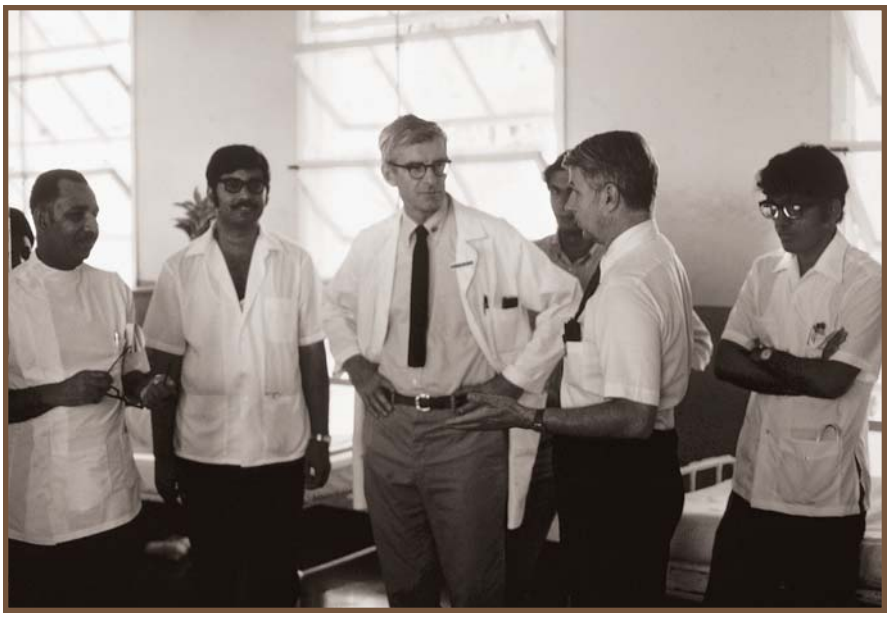

Christie also spent some time away from his New Hampshire practice working in international health. He is pictured above in 1971 in a rural Jamaican hospital, making ward rounds with local medical students (Christie is the tall one with the tie). He says the hospital had a medical staff of one—a Jamaican trained in England who was surgeon, internist, obstetrician, and hospital administrator.

One of our group's innovations proved quite satisfying. After five years of service, one became eligible for a six-month sabbatical. I was the first to be eligible and served aboard the S.S. Hope, a hospital ship.

one or more of their cases on the agenda. The ensuing discussions were often lively and became real learning experiences for everyone—in fact, they were far more popular than the occasional visiting lectures. Friendships developed and referrals began to take place, especially when specialists in surgery, medicine, pediatrics, and other disciplines began to join the hospitals' medical staffs. The academy met every month for 21 years. Dues of $10 a year covered the bar bills and the cost of printing and mailing the postcards. Attendance varied from half a dozen to 30 or more, depending on the season, the weather, and other variables.

The pathology practice soon developed into a professional association—one of the first established in New Hampshire—with at first two, then three, and eventually five full-time, board-certified pathologists. One of our group's innovations proved quite satisfying. After five years of continuous service as a member of the practice, one became eligible for what we called the "hemi-decimal semi-sabbatical." This allowed each of us to take six months off to do whatever we liked in the way of travel, education, or alternative service. I was the first to be eligible and served as pathologist and laboratory director on the *S.S. Hope,* a hospital ship that traveled to Third World countries. I also set up a school patterned on the NNESCLA in Kingston, Jamaica, meeting a great need in that country.

Eventually the group practice dispersed as the hospitals generated sufficient laboratory revenue and were at last each able to hire their own full-time pathologist. This resulted in my reversion to a solo practice toward the end of my career.

Early on, I learned that there were several aspects of the country pathologist's job that I hadn't known about. The first was forensic pathology. Until recently, New Hampshire had no medical examiner system, so this duty fell on pathologists in private practice. A typical scenario would be for a county attorney to call me, saying there had been a death under unusual circumstances and asking if I would perform an autopsy. The going rate was $200, which sometimes included an appearance to testify in court.

It was quite an imposition, but there was no reasonable alternative, so I practiced forensic pathology on top of everything else. I had been an assistant coroner in Muncie for two years, so I knew a bit about the field, but the responsibility of providing autopsy or lab data that could determine the outcome of a court case was daunting. Over the years, I did autopsies on victims of plane crashes, avalanches, auto accidents, crib deaths, drownings, murders, and suicides—and even on an occasional hiker who died of hypothermia during mid-summer in the Presidential Range.

The most sensational autopsy I did was on a serial rapist-killer, Christopher Wilder, who was apprehended in Colebrook. Wilder managed to kill himself (accidentally) with his .357 handgun while trying to shoot a heroic state trooper who had him in a bear hug. My autopsy report included a unique final diagnosis—"cardiac obliteration," a term not used, as far as I know, before or since.

The case that gave me and the prosecuting attorney the most satisfaction was one in which the autopsy findings led to the first jail sentence ever imposed on a careless hunter. The hunter had shot and killed a newsboy on a country road, mistaking him for a deer. At autopsy, careful dissection revealed fragments of metal adhered to the bone along the bullet's course through the boy's chest. Police scoured the woods where he'd fallen and, miraculously, found the almost intact slug that had killed him. The chemical composition of the slug and the fragments from the boy's chest exactly matched that of ammunition in the magazine of the hunter's shotgun—convincingly linking the hunter to the crime. This established a precedent for future prosecutions and, I hope, has led to more care by hunters in identifying their targets.

Public health is another piece of the pathologist's job description. Over the years, I was involved in the resolution of a number of public-health issues, including three of some consequence. The first

was persuading the citizens of Lancaster at the annual town meeting to vote for an article a local dentist and I submitted, requiring the town to fluoridate its water. It was not unusual in the 1950s and 1960s for local residents to have had all their teeth extracted by the time they graduated from high school. The measure passed by a wide margin.

The second issue was the discovery in the lab at Androscoggin Valley Hospital in Berlin of the intestinal parasite *Giardia lamblia*. During an epidemic of a gastrointestinal illness thought to be "intestinal flu," an internist who was a native of Pakistan and savvy about parasites had ordered a stool examination on one of his patients with diarrhea. This led to a call to officials at the New Hampshire Department of Health, but they were disinterested in the problem. So I called the Communicable Disease Center (CDC, now the Centers for Disease Control and Prevention), and it was soon established that Berlin was having the second-largest epidemic of giardiasis ever seen in the U.S.

The CDC's sleuthing eventually pinpointed an error in Berlin's newly constructed water-treatment plant: incredibly, the plumbing had been installed in such a way that the parasite was being filtered out of the river water, concentrated, and then injected into the drinking-water supply. The epidemic was controlled when the filtration problem was corrected. Beaver were among the likeliest vectors capable of delivering the parasite into the watershed, so I arranged with the Fish and Game Department to obtain the carcasses of any beaver trapped in the area the following winter. Autopsies on 70 animals disclosed no evidence of *Giardia*, so the source of the parasite was, and remains, a mystery.

The third issue had to do with the backyard barrel-burning of trash in Lancaster. It was evident that recycling was not working in rural areas and that most households disposed of their refuse by incinerating it in 55-gallon drums. A little research led me to discover that more dioxin, an extremely toxic chlorinated hydrocarbon, was produced by backyard barrel-burning in 1995 than by all the municipal incinerators in the country before the Environmental Protection Agency tightened its rules on incineration.

I wrote letters to the editor of the *Coos County Democrat*, talked and lobbied about the problem for two years, and each year entered an article in the town warrant prohibiting barrel-burning. Both times the article was voted down by residents who contended that they were being deprived of their freedom to do what they wanted with their trash. But the battle was eventually won on a larger scale. With the help of our local representatives to the state legislature and a couple of state agencies, a bill was passed that made barrel-burning illegal throughout the state.

Christie's international service included two rotations aboard the *S.S. Hope,* a hospital ship that carried U.S. medical expertise and training to the Third World. Above, pictured on the ship's gangplank, are the 1971 graduates of a laboratory technology school that Christie set up in Jamaica. And below is a line of patients waiting to take part in an immunization clinic in Bangor Rudge, Jamaica.

There were several aspects of the country pathologist's job that I hadn't known about. The first was forensic pathology. I did autopsies on victims of plane crashes, avalanches, auto accidents, drownings, murders, and suicides.

My public health activities also extended to the schools. In the early 1960s, long before smoking became a national cause, the director of the Littleton YMCA, Gene Clark, joined me in a *pro bono* program of smoking education. We concluded that we weren't likely to have much impact on the smoking habits of adults, so we targeted the schools. Initially we talked to assemblies of high school students—Gene about the impact of smoking on their ability to excel in sports and me about the medical effects of smoking, illustrated with color slides of smoke-stained lungs and atherosclerotic arteries. But feedback from teachers and our own observations of the teenagers' cynicism led us to concen-

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