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LESTER REYNOLD DRAGSTEDT
1893—1975

A Biographical Memoir by
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WANGENSTEEN

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Biographical Memoir

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Lester R. Dragstedt

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October 2, 1893–July 16, 1975

BY OWEN H. WANGENSTEEN
AND
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LESTER REYNOLD DRAGSTEDT, one of America's great surgical scientists, approaching his eighty-second birthday, died suddenly of an unexpected heart attack on July 16, 1975 at his summer home at Wabigama, a colony he and other University of Chicago scientists had founded on Elk Lake, Michigan, in 1951. Dragstedt had been active and apparently well up until the very end.

Dragstedt was born in Anaconda, Montana, on October 2, 1893, of Swedish immigrant parents. In his early life, Lester was encouraged by his father to memorize poetry with a special appeal to him, as well as Biblical passages and fragments of famous speeches. These he frequently recited from memory at various gatherings in Anaconda, a talent which found ready favor with many audiences and served him well in informal presentations throughout his professional life. Young Dragstedt graduated valedictorian of his high school class and was offered scholarships at the University of Chicago and other institutions. At this juncture, A. J. Carlson, a long-time friend of the Dragstedts who had defected from the ministry to become an internationally renowned professor of physiology at the University of Chicago, intervened and wisely advised the senior Dragstedt, "Send the boy to Chicago. They will find out in three months if he has any

brains and, if he does not, you can bring him back to Anaconda and put him to work in the copper smelter.”*

In the beginning, Dragstedt, entertained the idea of becoming a physicist, having enjoyed the privilege of hearing lectures by Professor Robert Millikan. He was greatly influenced, however, by the inquiring and critical mind of A. J. Carlson, and upon graduation with a Bachelor of Science degree in 1915, enrolled in the graduate program at the University of Chicago as a student in physiology. Lester acquired a Master of Science degree in 1916 and a Doctor of Philosophy degree in physiology in 1920. An M.D. degree from Rush Medical College followed in 1921.

During his graduate studies, Dragstedt became a talented operating surgeon, having acquired skills operating upon animals in pursuit of physiological experiments. Though attracted to surgery, he was convinced that a career in physiology held out greater promise for innovative accomplishments.

Lester's first academic appointment was instructor of pharmacology at the State University of Iowa in 1916; the following year he became assistant professor of physiology there, a position to which he returned in 1919 after military service in World War I. It was at Iowa that Lester met Gladys Shoesmith, then a student at the University. Four years later, in 1922, they were married, by which time this talented young lady was not only a teacher of English, but principal of a school. She gave up her own career for another for which she was eminently suited—becoming Lester's constant companion and devoted supporter, in fair and stormy weather, throughout his illustrious life.

Dragstedt returned to the University of Chicago in 1920 as assistant professor of physiology and in 1923 became pro-

* John H. Landor, "L.R.D.—Recollections and Reminiscences," *Surgery*, 8 (1977): 443.

fessor and chairman of the Department of Pharmacology and Physiology at Northwestern University. He maintained throughout his career a very close association with Carlson, his loyal mentor and advisor.

Dragstedt's second career began in 1925 when Dallas Phemister was appointed the first full-time professor and chairman of the new Department of Surgery at the University of Chicago. Prior thereto, Phemister had been in active surgical practice but had exhibited strong academic leanings. Before taking up his new duties, Phemister went to London and Europe to work and observe in preclinical science departments and to ready himself for the new opportunities and responsibilities at the University. Phemister appointed Dragstedt consultant to the architect to design suitable research facilities for members of the Department of Surgery. At the conclusion of this service, Phemister remarked to Dragstedt, "I am interested in teaching physiology to surgeons."* Phemister was convinced that Dragstedt, with his strong background in physiology and pharmacology, could make an important contribution to the new Department of Surgery, and he persuaded Lester in 1925 to abandon a promising career in physiology to become a physiologist-surgeon. Already skilled in the performance of technically difficult operations upon dogs, Dragstedt emerged as one of the great surgeons of the alimentary tract of his generation.

As a Rockefeller Fellow, Dragstedt went abroad in 1925 to gain experience in surgical pathology and clinical surgery. This was a dozen years before the development of the American Board of Surgery, which undoubtedly would not have lent its seal of approval to Dragstedt's unorthodox scheme of acquiring training in clinical surgery for the academic arena. Lester was accompanied by his mother; his wife, Gladys; and

*E. R. Woodward, "Lester R. Dragstedt, M.D., Ph.D.," *Gastroenterology*, 70 (1976): 3.

their daughter, Charlotte. Carol was born during the two-year stay in Europe.

Following temporary stops in Paris, at de Quervain's surgical clinic in Bern, Switzerland, and in Vienna with Eiselsberg, Dragstedt spent several months performing post-mortem examinations at the Allgemeines Krankenhaus under the tutelage of Jakob Erdheim, whom Dragstedt came to admire greatly. He then proceeded to Budapest and worked under the direction of the famed gastric surgeon, Eugen Polya, and later with Professor Hümer Hültl at St. Rochus Hospital. Lester fell heir to a rich experience in operative surgery under these teachers for a fee of \$150 a month. When Dragstedt returned, Phemister gave him an appointment as associate professor of surgery at the University of Chicago.

Phemister was unquestionably correct in his belief that Dragstedt could be persuaded to become a clinician. In fact, the titles of Dragstedt's papers—from his first publication in 1916 up to the time he accepted Phemister's proposal in 1925—suggest that here was a clinician in spirit, employing physiologic approaches in the resolution of clinical problems, a practice that Dragstedt continued throughout his great career.

Concerning Dragstedt's unusual training for clinical surgery, it may be recalled that Harvey Cushing remarked, concerning his own years in the laboratory with Hugo Kronecker in Bern and with Charles Sherrington at Liverpool, "I acquired more of real value for my surgical work than in my previous six years' service as a hospital intern."* Apart from native talent, it was Dragstedt's prior training in physiology and consistent use of scientific methods that accounted for his unusual success as a clinical surgeon.

*Harvey Cushing, "Instruction in Operative Medicine," *Yale Medical Journal*, 12 (1906): 879.

DRAGSTEDT'S VIEWS OF SURGICAL TRAINING
AND HOW HE BECAME A SURGEON

Brief reference has been made to Dragstedt's preparation to become a surgeon, but who can speak better to the point than Dragstedt himself? In response to a letter of October 20, 1971, complaining of the rigidity of the training program of the American Board of Surgery, Dragstedt replied with a long letter on December 29, in which he outlined his own unconventional scheme of surgical training. His letter is so unique and tells so much about Dragstedt that it deserves to be quoted as written:

I enjoyed reading your letter of October 20 very much indeed. Like you, I believe there should be more than one road to Rome. I have an idea that there is actually more than one road to Rome, but at present there seems to be only one road to certification by the American Board of Surgery. I have long felt that the rigid program of the Board tends to stifle creative work. When I was in charge of surgery at Chicago I required that the applicants for residency in general surgery spend a full year in laboratory research before entering upon the clinical part of their training in the residency. We maintained this full-time research year as an integral part of the residency training all during my tenure. I am not certain, however, that it is being maintained at the present time. During this year of research many of our prospective residents worked with me in my laboratory. I endeavored to get them to start thinking about research problems that were both important and practical for the limited time period. For the most part, however, when they began their research they worked with me on problems that I had already started, but not finished. On the way they learned the method of research and thought about problems of their own. I believe this method valuable for most of the young men who enter upon a research career. A few men had original ideas and some notion as to how to go about solving them. Usually after a year of work each of the residents has a fair concept of the method of research and how to go about it.

Now you are interested in my own training and experience. Here is a brief rundown of my medical career. At the end of my second year in the medical school at the University of Chicago I received a B.S. in Science. I then entered upon the training for a Ph.D. in Physiology with Dr. A. J. Carlson. At the end of one year of this training, I secured a Masters Degree

in Physiology with a minor degree in Pathology. I then went on to the University of Iowa as Instructor in Pharmacology. After one year there I was promoted to Assistant Professor of Physiology at the University of Iowa. While at Iowa I introduced mammalian work in both physiology and pharmacology and continued my research on intestinal obstruction and succeeded in keeping dogs alive after complete removal of the duodenum. I was gratified many years later to get a letter from Dr. [Allen] Whipple telling me that it was this paper that suggested to him his radical operation for cancer of the pancreas. While I was in Iowa City the United States got into World War I and I joined the Army. I went first to Washington, D.C. to the Army Medical School and was assigned to work on typhoid vaccine with Colonel Vedder. I was a private second class at this time. After several months I got tired of this activity and requested a transfer. I was thereupon sent out to Fort Leavenworth, Kansas to get training in the Army Medical corps. When they found out that I had training in Pathology I was made a second lieutenant and sent to Yale. While I worked at Yale under Colonel Winternitz in the toxicity laboratory I was assigned to teach toxicology to the officers of the medical corps stationed at Yale. The Spanish influenza became epidemic at that time and I was transferred to Camp Merritt, New Jersey as the camp pathologist. This was my best experience in the Army as I had to do autopsies from morning until night for about eight months. When the Armistice was signed I got the Dean at the Medical School in Iowa to request my return to teaching. After about half of a year of teaching at Iowa I decided to return to Rush Medical College and get my M.D. degree. While taking my last two years of medicine at Rush I also finished up the requirements for the Ph.D. degree at the University of Chicago. During this time I presented several papers on intestinal obstruction, removal of the duodenum and parathyroid tetany for the Chicago Surgical Society. Dr. Phemister was one of my teachers at Rush and was apparently impressed by the papers that I gave at the Chicago Surgical Society. When I finished my medicine Dr. Phemister urged me to take an internship in the Presbyterian Hospital with a view to becoming a surgeon. At that time there was no regular residency of the present type available and one became a surgeon by becoming an apprentice to an operating surgeon. I was reluctant to give up research, and in this frame of mind Dr. Carlson persuaded me to come back to his Department of Physiology as an Associate Professor. I stayed there for two years and then became Professor of Physiology and Pharmacology and Chairman of the Department at Northwestern University Medical School. Mrs. Montgomery Ward gave a large amount of money for the erection of a new medical school and this

activity kept me quite busy. Along about this time the Rockefeller Foundation became interested in establishing a new type of medical school on the campus at the University of Chicago. They chose Dr. Phemister to be the first chairman of the department of surgery. Dr. Phemister wanted a department of surgery characterized by research activity. He prevailed upon me to give up my appointment at Northwestern and join the Department of Surgery as an associate professor of surgery. He said he thought it would be easier for a scientist to learn to be a surgeon than for a surgeon to learn to be a scientist. I was very happy at the appointment and taking his advice went to Europe for clinical training. I had no luck in Paris and then went on to Berne, Switzerland. I served as a voluntary assistant to Professor DeQuervain for three months. The work there was mostly thyroid surgery. I wanted training in abdominal work and so went on to Vienna. While in Vienna I took advantage of the opportunity to work with Jacob Erdheim, one of the greatest teachers that I have ever met. I worked all morning in pathology with Erdheim and in the afternoon with a young surgeon named Goldsmith at the Rothschild Hospital. While I was working at the Rothschild Hospital with Goldsmith I got acquainted with Fritz Silverstein, Head of the Department of Experimental Pathology at the University of Vienna. Silverstein knew of my work on the duodenum and asked me if the dogs from whom I'd removed the duodenum developed pernicious anemia. I had to admit to my chagrin that I had not made any measurements of the blood to see if this was the case so I embarked on a program of taking out the duodenum for Fritz Silverstein in Paltauf's old laboratory. While there I got acquainted with a number of the active research men at the University of Vienna—Pineles, Frölich, Winternitz, and many others. I was urged to go over and work with Professor von Eiselsberg which I did as a voluntary assistant for a short period. I was anxious to get to do some operating myself by this time and so took advantage of the economic conditions in this post-war period to go on to Budapest. I went immediately to Polya and told him that we knew about his fine work in America, that I would like to be his assistant and that I could pay him \$150 a month for the privilege. All this was said in one breath. He readily assented and took me on as his first assistant. After he did a gastric resection for a duodenal ulcer he invited me to do the next one. I had done a lot of these, of course, in dogs, but had never done a gastric resection in man. I did the resection in the way that I customarily did in the dogs and he was apparently very pleased. I had been taught to close the duodenal stump by an ingenious method that I believe originated with Halsted. I had been taught this during my student period in the physiology laboratory in

Chicago by Dr. James J. Morehead [Moorhead], a local surgeon. Morehead had taught me how to do gastroenterostomies, gastric resections, Pavlov pouches and so on during the course of our collaboration on the problem of intestinal obstruction. Of course I didn't say anything to Polya about this work on the dogs. He apparently thought I was a safe operator and told me to go ahead and do all the operating I wanted. After a short period with Polya, however, I heard that Professor Hümer Hüttl at the St. Rochus Hospital was a much better surgeon. Accordingly I went on to see Professor Hüttl and used the same formula that had gotten me a place with Polya. Hüttl accepted and again took me on as his first assistant. Again I helped him with one operation and the next one was a partial gastrectomy for duodenal ulcer. He asked me if I would like to do that operation. I agreed, did the operation the way I had done it on the dog, Hüttl was pleased and told me to go on and do all the operating I wanted. I realized, however, that his assistants were there for that kind of work so I assured them I would not do all the operating but that I would like to assist each one of them so that I would learn the methods that they used. This proved to be a good formula and I had a happy time in this hospital for a period of about eight months.

I then returned to Chicago and became an assistant to Dr. Phemister in the Presbyterian Hospital in the mornings and a volunteer resident in the Cook County Hospital in the afternoons. After about six months of this work Billings Hospital was completed and we moved over there. When the hospital was opened I started by serving as Dr. Phemister's assistant and began my research work in the laboratory. As soon as patients began to come in sufficient numbers Dr. Phemister wanted me to take my own service with a resident and an intern. At first I tried to send my big cases to Dr. Phemister, but he refused to take them and insisted that I do them. He was in the operating room next door so I was comforted by the thought that I could always call on him if I should get in a tight spot. Well, Owen, this is the way I became a surgeon. It is a road to Rome that I do not believe is practical anymore. It was made possible by the economic conditions in Vienna and Budapest and by the desire of the Rockefeller Foundation to build a department of surgery where some of the surgeons were investigators. However, I think some sort of modification of this road to Rome might be possible in our modern world.

DRAGSTEDT'S GASTRIC SECRETORY STUDIES

It is not the intent of the authors to examine every publication by the subject of this memoir, but rather to look briefly

at his main works. Dragstedt's most important work in a long and productive career concerned aspects of gastric secretion and digestion. It is entirely appropriate, therefore, to trace briefly the long story of theories and early experiments concerning the stomach's behavior. Theories of the nature of gastric secretion are as old as Hippocrates (460–370 B.C.), who thought of that process as cooking—which he termed “pepsis.” Theodor Schwann in 1936 confirmed the presence of William Beaumont's “chemical principle” in gastric juice, which he observed was destroyed by heating; being a student of Hippocratic writings, Schwann named the proteolytic enzyme “pepsin.” In an essay brought before London's Royal Society in 1686, Edward Tyson had established that the gastric juice contained a corrosive menstruum. In studies on the ostrich, the Italian Antonio Vallisnieri (1713) had ascertained the presence of an active digestive agent in the juice. In 1752, René Réaumur had birds, dogs, and a sheep swallow sponges placed in perforated spheres, permitting direct contact with the gastric juice. He definitely established the solvent power of juice, as did Edward Stevens of Edinburgh in 1777 in similar studies on man, dogs, and sheep. Lazaro Spallanzani, in 1780, experimented on fish, cats, dogs, and man, also affirming the presence of an active digestive agent within the gastric juice. In 1786, John Hunter performed experiments on fish, lizards, and frogs, confirming the findings of prior investigators. He established the idea of the “living principle,” concluding that gastric juice does not digest living things, a thesis that Claude Bernard disproved in 1844.

In his significant monograph of 1833, following studies extending back to 1825, Beaumont, a pioneer American military surgeon far removed from academic halls, concluded his extended studies on Alexis St. Martin, who had suffered a shotgun shell injury at close range (1822) to the lower left thorax and upper abdomen. Beaumont was able to close the thoracic wound, but throughout St. Martin's long life the

gastric fistula persisted. Beaumont completed his studies on the secretory behavior of St. Martin's stomach with fifty-one observations, two of which were original and fundamental. In conclusion #24, he established the presence of a "chemical principle," antedating by three years the observations of Johannes Müller and Schwann. In conclusion #25, Beaumont demonstrated that the empty stomach contains no hydrochloric acid; that it takes the stimulus of ingested food to provoke secretion—an observation with which many distinguished physiologists disagreed. They failed to recognize that only patients with duodenal ulcer, one of the strongest manifestations of the ulcer diathesis, actually did have free hydrochloric acid in their stomachs, devoid of food.*

GASTRIC FISTULA STUDIES

With James Ellis, Dragstedt (1930) observed that total loss of gastric juice through a gastric fistula or total pyloric obstruction was uniformly fatal, and as the New York surgeons J. A. Hartwell and J. P. Hoguet (1912) had demonstrated in duodenojejunal obstructions in dogs, responded well to liberal intravenous administration of saline solution. Loss of the other gastrointestinal ion, potassium (K), W. B. O'Shaughnessy (1831) had recognized and successfully remedied by intravenous infusions of both the K and Na ions for the severe diarrhea of cholera patients, deficits he replaced in the amounts lost. James Gamble (1925) confirmed the importance of replacement of the K ion in high intestinal obstructions in animals and man. Dragstedt's gastric secretory studies began in 1924, investigations he continued throughout the remainder of a long and creative career.

* O. H. Wangensteen, "Claude Bernard's Work on Digestion," in *Claude Bernard and Experimental Medicine*, ed. Francisco Grande and M. B. Visscher (Cambridge, Mass.: Schenkman, 1967), pp. 45-74.

VAGOTOMY STUDIES

Dragstedt pursued the problem of the pathogenesis of gastric and duodenal ulcer over many years, studies that culminated in Dragstedt's reintroduction (1943) of transthoracic truncal section of both vagi nerves for duodenal ulcer, which Dragstedt and Frederick M. Owens announced they had performed upon patients with duodenal ulcer, the most refractory to treatment of all common manifestations of the peptic ulcer diathesis. The operation was not an innovation; Ivan Pavlov, the great Russian physiologist, and his associates had established the significant influence of the vagi nerves upon canine gastric secretion in the early 1890's. André Latarjet, of Lyons, France, had performed both supra- and infradiaphragmatic vagotomy for gastric states in man, including several instances of duodenal ulcer. Latarjet (1922-1924) learned from his own experience that bilateral vagal section necessitated a drainage procedure because of impaired emptying. Latarjet performed supplemental pyloroplasty to correct the situation. Dragstedt, too, learned the need for a complemental gastrojejunostomy to provide adequate gastric emptying. The effect of vagal section on gastric secretion was to occupy a major share of Dragstedt's attention throughout the remainder of his professional life.

The American Gastroenterological Association, dominated primarily by clinicians, lent Dragstedt's contribution on vagotomy faint praise in the early 1950's. A. V. Pollock of Leeds saved the day for vagotomy (*Lancet* 2: 785-800, 1952) in a report upon 1,524 vagotomies performed for peptic ulcer from scattered large metropolitan areas in Britain. Recurrent neostomal ulcer occurred in 6 percent when done for duodenal ulcer. When complemental gastric drainage was added, the recurrence rate was only 1 percent. Summarized Pollock, "this procedure [vagotomy] will stand or fall by the proved recurrence-rate" (p. 800).

In studies of carefully gathered physiological data, extending over many years, Dragstedt persuaded the surgical profession throughout the world that vagal section was an important component of any and all surgical procedures directed at overcoming the strong acid-peptic ulcer diathesis of duodenal ulcer. It came as a great surprise to many of his fellow surgeons and admirers to learn that Dragstedt (1936), the keenest and most ardent student of that problem, advised changing the name of peptic ulcer to "acid ulcer." Allusion has already been made to the important work of Beaumont (1833), more than a century earlier, and his conclusion that the gastric juice of his experimental subject, St. Martin, contained a "chemical principle" in addition to hydrochloric acid, a thesis arrived at by Beaumont in noting the influence of temperature upon the proteolytic quality of the gastric juice. He confirmed this finding by observing consistently the far greater digestive potential of gastric juice over HCl with a similar pH. Dragstedt's usual care in testing all premises had failed him in this instance.

THE ANTRAL EXCLUSION OPERATION

In 1895, the Vienna surgeon Anton Eiselsberg devised the antral exclusion operation to facilitate removal of difficult pyloric cancers and duodenal ulcers. Two decades later, his protégé Hans Haberer (1914) began to suspect that when gastric resection was accompanied by antral exclusion for duodenal ulcer, neostomal ulcer frequently occurred; by 1921, Haberer had given up the antral exclusion operation. It remained, however, for the London surgeon Heneage Ogilvie (1936, 1938) to demonstrate in two series of gastric resections for duodenal ulcer, one with antral exclusion and the other without, that Haberer had been correct in abandoning the antral exclusion operation for duodenal ulcer. Hans Smidt of Jena (1924) had shown in canine experiments that

antral exclusion pyramided the occurrence of neostomal ulcer attending gastric resection for duodenal ulcer; in dogs with an isolated gastric pouch, fed on a meat diet, Smidt observed that, following antral exclusion, such dogs secreted 80 percent more HCl than did his controls. It remained for Dragstedt and his associates to confirm, in a succession of papers with solid data, Haberer's suspicion that antral exclusion was not a physiologic operation.

DRAGSTEDT REJECTED AUTOINTOXICATION AS THE
LETHAL FACTOR IN OBSTRUCTION

J. Z. Amussat (1839), a young Paris surgeon, operated upon his famous teacher, François Broussais, for an obstructing rectal cancer, attempting to destroy the cancer and relieve the obstruction with the cautery. Unfortunately, he perforated the bowel, and peritonitis ensued. Appreciating that his reputation as a surgeon was at stake in this unhappy occurrence, Amussat formulated the theory of autointoxication as the responsible agent in his teacher's demise. For almost a century, this thesis dominated medical and surgical thinking as the chief lethal factor in death from bowel obstruction.

In a series of experiments, George Whipple (1913–1917), Nobel Laureate, appeared to have confirmed the autointoxication theory, finding a "toxic proteose" within the distended lumen of the obstructed bowel. Dragstedt was the first to cast serious doubt upon this thesis (1919–20). He observed that isolated closed canine duodenojejunal loops perforated because of the secretory dominance of that segment of the bowel. However, when he left the ends of the isolated loop open to drain freely into the peritoneal cavity, such loops in time became sterile; when the ends of such isolated loops were closed, the dogs tolerated the situation without incident. Through the work of Gamble, of Harvard's Children's Hos-

pital, and others, the autointoxication theory as the lethal factor in bowel obstruction has been permanently set aside.

CANINE LIVER AUTOLYSIS

It should be observed that Dragstedt, though not trained as a microbiologist, made another significant discovery concerning the lethal factor attendant on leaving a small fragment of adult canine liver free in the peritoneal cavity, detached from its source of blood supply. Frank Mann (1923), of the Mayo Clinic research laboratories, had first made this observation in his classic studies on experimental canine hepatectomy. A number of experimentalists addressed themselves unsuccessfully to its solution. Dragstedt and Ellis (1930) then did a novel and telling experiment. They performed cesarean section on female dogs about to deliver their young. The livers of these unfed puppies, which had not had the opportunity to enjoy their mothers' milk, were placed in the peritoneal cavities of adult dogs. Unlike situations in which liver segments of equal weight from adult dogs were introduced intraperitoneally—which quite uniformly terminated in death of the recipient within 24 hours—liver implants from newborn un-nourished pups were well tolerated. When the abdomens of these canine recipients were explored a few weeks later, it was noted that the implants had been completely absorbed. An overlooked and forgotten observation of S. B. Wolbach (1909), Harvard pathologist, served to resolve the mystery: the adult canine liver contains very pathogenic anaerobic bacteria of the *Bacillus Welchii* type. Dragstedt's surmise proved correct and confirmed Mann's observation that a small fragment of adult canine liver, unattached to its normal source of blood supply, was lethal.

DRAGSTEDT AND THE PARATHYROIDS

F. D. Recklinghausen (1891) described osteitis cystica. Max Askanazy (1904), another distinguished German pathol-

ogist, first identified that condition with tumors of the parathyroid gland. It remained for Felix Mandl (1925), a young surgeon at the Allgemeines Krankenhaus in Vienna, to excise a tumor of the left inferior parathyroid gland and relieve the pain and stop spontaneous fractures in a patient with advanced osteitis fibrosa cystica who had a milky-white urine, owing to the inordinately high excretion of calcium in the urine.

This was about the time that Dragstedt began addressing himself to the problem of parathyroid tetany. The parathyroid glands had been discovered by Ivar Sandström, a young Swedish medical student (1880), an observation he encountered difficulty in getting published. When thyroidectomy was undertaken by Theodor Kocher of Bern, the first surgeon Nobel Laureate (1909), he performed excision of both lobes of the thyroid gland and its isthmus, and unwittingly excised the parathyroids too, the existence of which he was unaware. This sequel of thyroidectomy he subsequently described as “cachexia strumipriva” (1883). W. G. MacCallum, of The Hopkins, related (1909) that post parathyroidectomy tetany could be controlled by the administration of calcium, demonstrating that the parathyroids had an important role in calcium metabolism.

Dragstedt had formulated the thesis that loss of the parathyroids impaired the resistance of the body to toxins, a situation that he combatted with some success in dogs with a milk diet complemented with lactose. The diet factor again! Meanwhile, Adolph Hanson (1923), a general surgeon of Fairbault, Minnesota, isolated a potent bovine parathyroid extract with the helpful advice of Arthur Hirschfelder, professor of pharmacology at the University of Minnesota. J. B. Collip (1925) isolated parathormone (which he initially called parathyrin), confirming MacCallum’s (1909) thesis that the parathyroids control calcium metabolism. Had Dragstedt tested MacCallum’s 1909 premise, his own address to the

likely function of the parathyroids undoubtedly would have followed a different pattern. To be thrust into an unexplored field of investigation, almost devoid of guidelines, is always a risky undertaking.

PANCREATIC STUDIES

One of Dragstedt's broadest investigative efforts concerned the pancreas. He demonstrated that a complete external pancreatic fistula was compatible with life; that a complete biliary fistula was not lethal, but did diminish pancreatic juice recovered through an inlying pancreatic duct cannula. He and his associates reported that the adult canine pancreas, like the liver, contained anaerobic bacilli of the *Welchii* pattern, responsible for the high lethal factor of acute hemorrhagic pancreatitis or necrosis, occasioned by retrojection of bile into the duct of Wirsung, or other factors predisposing to pancreatitis. Dragstedt began his historic studies on canine pancreatectomy in 1936, observing, as had Frank N. Allan and co-workers at the University of Toronto in 1924, that total pancreatectomy in the dog was lethal, even though supported by insulin. Dragstedt observed that the addition of a liberal amount of raw bovine pancreas to the diet offered considerable protection against fatty infiltration of the liver, prolonging the lives of the dogs. Dragstedt went on to develop an alcoholic extract of the raw pancreas that also prolonged the lives of depancreatized dogs, concluding the protective agent to be another pancreatic hormone. Dragstedt called the raw pancreatic extract lipocaic ("burns fat") (1938). The Toronto biochemist I. L. Chaikoff observed (*J. Biol. Chem.*, 160: 489, 1945) that a liberal oral intake of methionine, added to a low-fat, high-protein diet, offered the same protection against fatty liver, with prolongation of life, as did raw pancreas or the alcoholic extract of Dragstedt. Chaikoff and his associates believed that the amino acid

methionine enhanced the synthesis of choline, which they believed to be the primary lipotropic factor, but which Dragstedt denied. The exact mechanism of the protection provided by raw pancreas, an alcoholic extract thereof (lipocaic), or methionine has not been completely resolved. Most investigators believe that Dragstedt's alcoholic pancreatic extract is not a true pancreatic hormone.

Dragstedt and several associates worked very assiduously and persistently upon this complicated and intricate problem over the 1936–1946 decade, writing a succession of twenty journal articles upon the subject. The term lipocaic is still to be found in medical dictionaries, but that it meets the criteria of a hormone has not been definitely established. It is quite clear that Dragstedt's impact upon the importance of the liver-pancreas relationship has been very significant, even though his conclusion concerning the exact operative nature of that relationship has been challenged.

The Council on Pharmacy and Chemistry of the AMA assessed the status of lipocaic (*JAMA*, 114: 1454–55, 1940). The Council concluded: "In view of the experimental status of lipocaic, the Council postponed consideration to await development of further critical evidence and expressed the view that the preparation should not be recognized for routine practice."

Dragstedt and his co-workers demonstrated that the external secretion of the pancreas did not preclude the deposition of fat in the liver attending canine pancreatectomy, as did feeding raw pancreas. At this time, Dragstedt had become completely absorbed in the clinical role of vagotomy as an effective anti-peptic ulcer remedy and did not pursue the lipotropic action of lipocaic further.

In his many and broad addresses on problems of the pancreas (1933–46), Dragstedt did not become involved in the controversy over the hyperglycemic effect occasionally

observed following insulin administration. This was long believed to have been an insulin contamination, but after more than a quarter of a century of consecutive work in competent hands, it has turned out to be another powerful pancreatic hormone, glucagon, a discovery which emerged also from experimental pancreatectomy.

The recent interesting work of Thomas E. Starzl of Denver on the liver-pancreas axis has shown that the problem is far more complicated than the initial workers had contemplated. Recognizing that portocaval shunts predispose to fatty infiltration of the liver, Starzl assessed the role of splanchnic blood flow upon isolated liver segments. He demonstrated that the pancreatico-gastric segment of the splanchnic blood flow had a far greater influence in supporting portal insulin than did the intestinal segment of the splanchnic blood supply and also retarded fatty infiltration of the liver more effectively (*Lancet* 2:1241-42, 1975).

DRAGSTEDT SUCCEEDS PHEMISTER
AS SURGICAL CHAIRMAN

In 1947, Cornelius P. Rhoads, known to his friends as Dusty, and I (O.W.) spent a long evening at my hotel in New York, discussing surgery's role in the management of cancer. The eminent pathologist James Ewing (1855-1943), who had long been in command at the Memorial Cancer Hospital in New York, had suffered from painful conditions for which surgery in very competent hands had offered incomplete relief. Ewing was not, therefore, partial to surgery or surgeons. The coming of Rhoads to the Memorial was a great boon for surgery in cancer management. We talked well into the wee hours of the morning, and Dusty urged me to come on as their chief surgeon, a generous offer which I declined. I advised Rhoads to offer the opportunity to Alexander Brunschwig at the University of Chicago, a far

better qualified surgeon than I for the task. Brunschwig had published a nice monograph on pancreatico-duodenectomy. He was an aggressive cancer surgeon and well suited for the task.

Little did I then know that this suggestion was to have an important repercussion on Dragstedt's career. It had come to his attention that Plemister, chairman of the Department of Surgery, who had encouraged Lester in 1925 to enter surgery, favored Brunschwig as his own successor; Dragstedt apparently was being overlooked in the selection process. Plemister was powerful enough in the University to make his recommendation stick. In a conversation many years later, Lester affirmed this circumstance, subsequently confirmed in a letter exchange with Loyal Davis (December 2, 1975), then chairman of the Department of Surgery at Northwestern University. Davis told Lester he would have a place for him and would welcome him in Northwestern's Department of Surgery should he be bypassed in the selection process. Davis added that he had no funds for the position, and Lester would have to earn his salary by practice—an arrangement to which Dragstedt assented. Indirectly, therefore, and unwittingly, this surgeon had a hand in making Dragstedt Plemister's successor at the University of Chicago. The migration of Brunschwig to New York served the careers of both men in a very satisfying manner.

DRAGSTEDT'S 1954 APPRAISAL OF HIS SCIENTIFIC ACHIEVEMENTS

In a letter to Academy Home Secretary A. Wetmore on March 22, 1954, Dragstedt indicated the following as his most significant contributions to medical literature: 1) that removal of the duodenum is compatible with life (1918); 2) that dogs undergoing total parathyroidectomy can be kept alive indefinitely when maintained on a milk diet fortified

with lactose; 3) that an alcoholic extract of raw pancreas constitutes the hormone lipocaic, which with complementary insulin will sustain dogs in good health following total pancreatectomy, obviating fatty infiltration of the liver; 4) the pathogenesis of gastric and duodenal ulcer and the demonstration of complete vagal section as an effectual method of treating refractory duodenal ulcers.

Indeed, this was a very modest appraisal of his life's work five years prior to retirement from the University of Chicago. Dragstedt was to survive yet another twenty-one years and was to continue the diligent pursuit of his scientific endeavors through that entire period.

Dragstedt's research upon the parathyroids began in 1922, three years before their function had been clarified by Mandl (1925). Lester's work on the control of tetany attending complete parathyroidectomy had persuaded him that the parathyroids had an important role in complementing the liver in detoxifying alimentary tract toxins, a thesis that died when the work of Hanson (1923) and Collip (1925) provided strong support for MacCallum's thesis (1929) that the parathyroids controlled calcium metabolism.

RETIREMENT FROM CHAIRMANSHIP AT THE UNIVERSITY OF CHICAGO

At a dinner at the University of Chicago, May 28, 1959, honoring Lester Dragstedt's long years of successful scientific endeavor, in reply to brief speeches by the Toastmaster Percival Bailey, Paul Cannon, Dean Lowell Coggeshall, and this surgeon (O.W.), Lester rose to make his response. He had notes, but did not use them. He spoke warmly of his gratitude to the University, said he, a truly great University, "one of the best in the world." He spoke of the loyalty of his family, children, and grandchildren; of his debt to his University

colleagues, both current and departed; of his gratitude to his many surgeon-friends in the Chicago area; and finally of his wife, Gladys, concerning whom he said, "To her I owe everything; my success and my friends." Lester obviously greatly appreciated the splendid opportunity the University had provided him and the loyalty of his friends and family.

PERSONAL HEALTH CHALLENGES

Dragstedt was a man of great vigor and indomitable spirit who enjoyed good health throughout most of his long life. He did, however, come to know the threat to a career that illness can bring. Perhaps few, if any, surgeons have had so large an experience in the performance of autopsies as Lester Dragstedt. It is not surprising, therefore, to learn that he contracted tuberculosis, which necessitated spending nine months in a tuberculosis sanatorium in Arizona. Subsequently, he underwent examination of his urinary tract at the hands of Chicago's well-known urologic surgeon, Herman Kretschmer, who discovered that Lester had a unilateral tuberculous kidney, demanding nephrectomy. Lester's brother Carl, a distinguished pharmacologist, was on hand for the operation and relates that the right renal artery was so short that Kretschmer was forced to leave a clamp on it. After the first wound dressing the next morning, Carl gradually released the clamp at intervals, latch by latch, until it was completely free, a somewhat risky practice that, with advances in vascular surgery, surgeons today are happy to forego.

Lester fortunately survived a severe bout with typhoid fever in 1927, during which he lost fifty pounds. Throughout most of his adult life, Lester was hard of hearing, a handicap he bore without complaint.

DRAGSTEDT JOINS HIS PROTÉGÉ WOODWARD
AT THE UNIVERSITY OF FLORIDA

When Dragstedt retired from his professorship at the University of Chicago in 1959 at age sixty-six, his protégé Edward Woodward invited him to come to the newly formed medical school at the University of Florida at Gainesville. The Dragstedts adapted happily to the Florida environment, delighted with the lush tropical vegetation, the bright birds that came to their feeders, and the delicate camelias that bloomed in the yard so abundantly under their care. As in Chicago, their home became a mecca for visiting scientists from America and abroad. Colleagues, students, children, and grandchildren recall the warmth and gaiety of gatherings in the Gainesville house, Lester's jovial and cheery hospitality, and Gladys' charm as hostess. They continued to travel widely; it was never a surprise to meet Lester in some remote airport, hospital, or art gallery—always with Gladys, his steadfast and perceptive companion, by his side. Summer-times they returned to their beloved Wabigama for family vacations.

A feature of Dragstedt's training program, pursued throughout his career at Chicago and in Florida, was the four o'clock afternoon tea in the laboratory, to which all Dragstedt protégés allude with nostalgic memories. These gatherings were always informal, with no prearranged agenda. The discussions were frank and open, permitting participation by all with a special interest in the subject matter. At Gainesville, Dragstedt continued his productive career as an experimental physiologist of the secretory behavior of the stomach, pancreas, and liver.

Woodward (1976) related that Dragstedt, without a note or lantern slide, presented a brilliant and lucid review of his

life's work in a commencement address in June 1975, to which his audience of students, faculty, and friends responded with a prolonged standing ovation, affirming Dragstedt's ability to instruct, hold the attention of, and charm his audience with any subject upon which he chose to speak. That parting commencement address, no doubt, took exhaustive and exhausting preparation. Upon its completion, Dragstedt departed with his family for his favorite and customary vacation spot on Elk Lake, Michigan—where he died, shortly after arrival, from a sudden, massive coronary occlusion. All efforts directed at resuscitation by his son, Dr. Lester Dragstedt II, proved unsuccessful.

Gladys Dragstedt died two years after Lester. They left four children: Charlotte (Mrs. Thomas Jeffrey), of Gainesville; Carol (Mrs. Robert N. Stauffer), of Atlanta; Lester R. II, surgeon of the Veterans Hospital, Des Moines, Iowa; and John Albert, of St. Mary's College, Oakland, California. The grandchildren number thirteen.

So passed into memory and history one of the great surgical physiologists of this century, who left an indelible and durable imprint upon every area in which he worked; an eminent surgical teacher who enlarged notably upon Plemister's training school for surgical academicians at the University of Chicago. All privileged to have worked with Lester Dragstedt recognized that here was an extraordinarily gifted individual, compassionate and friendly, sympathetically interested in all the problems of his associates. Is it any wonder that his memory is cherished with great pride and warm affection?

THE AUTHORS WISH to express their gratitude to Mrs. Jeffrey and to Dr. Lester R. Dragstedt II for helpful suggestions concerning various facets of the lives of their parents. Dr. Carl A. Dragstedt also supplied valuable data about his brother's life and career.

Many of Dragstedt's protégés were extremely helpful in providing information concerning his professional and scientific career, especially Drs. John H. Landor and Edward R. Woodward. To Dr. Charles F. Klinger, the authors acknowledge their gratitude for aid in the collection of many of Dragstedt's scientific papers and the arrangement of the bibliographic references.

HONORS AND DISTINCTIONS

DEGREES

- 1915 B.S., University of Chicago
1916 M.S., University of Chicago
1920 Ph.D., University of Chicago
1921 M.D., Rush Medical College, Chicago

HONORARY DEGREES

- 1953 Doctor *Honoris Causa*, University of Guadalajara, Mexico
1959 *Docteur Honoris Causa*, University of Lyons, France
1969 Sc.D., University of Florida, Gainesville
1973 Doctor *Honoris Causa*, University of Uppsala, Uppsala, Sweden

UNIVERSITY APPOINTMENTS

- 1916 Assistant, Department of Physiology, University of Chicago
1916–1917 Instructor, Pharmacology, State University of Iowa
1917–1919 Assistant Professor of Physiology, State University of Iowa
1920–1923 Assistant Professor of Physiology, University of Chicago
1923–1925 Professor and Head, Departments of Physiology and Pharmacology, Northwestern University
1925–1930 Associate Professor of Surgery, University of Chicago
1930–1948 Professor of Surgery, University of Chicago
1948–1959 Thomas D. Jones Distinguished Service Professor of Surgery and Chairman of the Department of Surgery, University of Chicago
1959–1975 Research Professor of Surgery, University of Florida, Gainesville

MEMBERSHIPS IN AMERICAN ORGANIZATIONS AND SOCIETIES

- National Academy of Sciences
Phi Beta Kappa
Sigma Xi
Alpha Omega Alpha
American Association for the Advancement of Science
American Physiological Society

Society for Experimental Biology and Medicine
 American Surgical Association
 American Society for Clinical Surgery
 American Gastroenterological Association
 American College of Physicians
 American College of Surgeons
 American Medical Association
 Central Surgical Society
 Institute of Medicine of Chicago
 American Academy of Arts and Sciences
 Honorary Member of the Surgical Societies of Seattle, Los Angeles, Detroit, Minneapolis, Southern California, Graduate Surgeons of Los Angeles, and Boston

HONORARY MEMBERSHIPS IN FOREIGN
 ORGANIZATIONS AND SOCIETIES

Surgical Society of Lyons
 Surgical Society of Paris
 Swedish Surgical Society
 Argentine Society of Gastroenterology
 Fellow of the Royal College of Physicians and Surgeons of Canada
 Fellow of the Royal College of Surgeons of England
 National Academy of Medicine of Mexico
 Royal Academy of Arts and Sciences of Uppsala, Sweden (Foreign Corresponding Member)
 Academy of Surgery of France
 Association of Mexican Gastroenterologists

AMERICAN HONORS AND AWARDS

- 1945 Silver Medal of the American Medical Association for original investigation
- 1946 Gold Medal of the Illinois State Medical Society for original investigation
- 1950 Gold Medal of the American Medical Association for original investigation
- 1961 Samuel D. Gross Prize of the Philadelphia Academy of Surgery
- 1963 Distinguished Service Award of the American Medical Association for research, teaching, and surgical practice

- 1964 Julius Friedenwald Medal of the American Gastroenterological Association for "Outstanding Achievement in Gastroenterology"
- 1964 Golden Plate from the Academy of Achievement
- 1964 Henry Jacob Bigelow Medal of the Boston Surgical Society for "Contributions to the Advancement of Surgery"
- 1965 Annual Award of the Gastrointestinal Research Foundation
- 1969 Distinguished Service Award (the first) and Gold Medal of the American Surgical Association

FOREIGN HONORS AND AWARDS

- 1953 Honorary Professor of Surgery at the University of Guadalajara, Mexico
- 1965 Gold Medal of the Surgical Society of Malmö, Sweden
- 1967 Royal Order of the North Star of Sweden, bestowed by the King of Sweden, for "Outstanding Contributions to the Science of Surgery"
- 1969 Silver Plaque of the Institute of Digestive Diseases and Nutrition of Mexico City
- 1969 Silver Plaque of the Association of Mexican Gastroenterologists

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1923

The pathogenesis of parathyroid tetany. Am. J. Physiol., 63:408-9.
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1926

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