

MEDICINE

How a Tall Man Grew Short

The Hormone From His Parathyroid Glands Was the Evil Potion That Made Captain Martell Lose 12 Inches

By JANE STAFFORD

SUPPOSE you found yourself shrinking, not in an awful dream but in real life. Suppose you grew twelve inches shorter. This does happen. It happened to Captain Charles Martell, valiant young sea captain.

He was master mariner in the merchant marine and when only 22 he was navigating transports through the war zone. If you had seen him then you would have been impressed by his size and powerful physique. But this husky, healthy man of six feet one began to shrink. He had pains in his legs and back and his muscles grew weaker. He stumbled often, fell over a chair and broke his arm. His fellow-officers poked fun at him because he was becoming pigeon-breasted.

He suffered from a rare and strange malady called hyperparathyroidism. It is a disease of the parathyroid glands. There are four of these in the human body, each about the size of a pea. They are located in the neck, as a general thing lying in pairs on the inner side and toward the back of each lobe of the thyroid gland. Tiny as they are, they exert a tremendous influence on the body, particularly on the bones.

Removal Fatal

Because they are so insignificant-looking and so closely attached to the thyroid gland, sometimes buried in it, physicians used to think they were just part of that gland. But when they were removed with the thyroid gland, in operations to relieve Graves' disease and goiter, dire things happened to the luckless patients. Agonizing muscular cramps and convulsions seized them and they died a death not unlike the horrible death of lockjaw or tetanus. From this similarity, the condition got its name of parathyroid tetany.

This condition results when the parathyroid glands are removed or when through injury or disease they fail to produce enough of the hormone by which they exert their influence on the body. Captain Martell suffered from just the opposite condition. His para-

thyroid glands became overactive and produced too much hormone.

This is a very unusual happening. It occurs so rarely, in fact, that before the case of Captain Charles Martell physicians and medical scientists generally knew very little about the condition or what caused it. But his unusual cooperation and courage enabled a group of doctors in New York and Boston to study this strange disease and learn all about it. Now they know what causes it, how it affects the bones, the blood and the rest of the body.

Pain Like Arthritis

Among the early symptoms of the ailment are rheumatic pains in the muscles and joints. Captain Martell suffered from these, all the time he was growing shorter and being teased because of his pigeon-breast. He persisted in his duties at sea even after the pain and muscle weakness made it difficult for him to climb stairs and ladders, until abdominal pain and vomiting forced him to seek medical aid. When he finally went to the marine hospital, the rheumatic pains led the physicians to diagnose his ailment as arthritis. You could hardly blame them for missing the true nature of his malady. Hyperparathyroidism is not encountered in the general run of marine hospital practice, or other medical practice, for that matter.

So for one year he was treated for arthritis. But he did not improve. At this time his height had decreased from six feet one to five feet eight and one-half inches. His neck had shortened and thickened so that he had to wear larger collars. It was at the end of the year's treatment that he stumbled over a chair, breaking both bones of his left forearm.

An X-ray picture taken at this time showed that his bones were less dense than normal, which suggested that he was suffering from the bone disease, osteomalacia. For the next two years he remained in the Marine Hospital at Staten Island. His broken arm had to stay in a cast for nine months before the bones knit. During the two years



CAPTAIN CHARLES MARTELL

NOT A PHYSICIAN

The man responsible for the present knowledge of the rare disease hyperparathyroidism was not a physician. Nevertheless, he deserves a prominent place among the pioneers of medicine. Captain Martell's dauntless courage and his desire to add to medical knowledge caused him to submit to the surgeon's knife repeatedly, that others might be saved from his painful death.

he suffered two additional fractures of his arms.

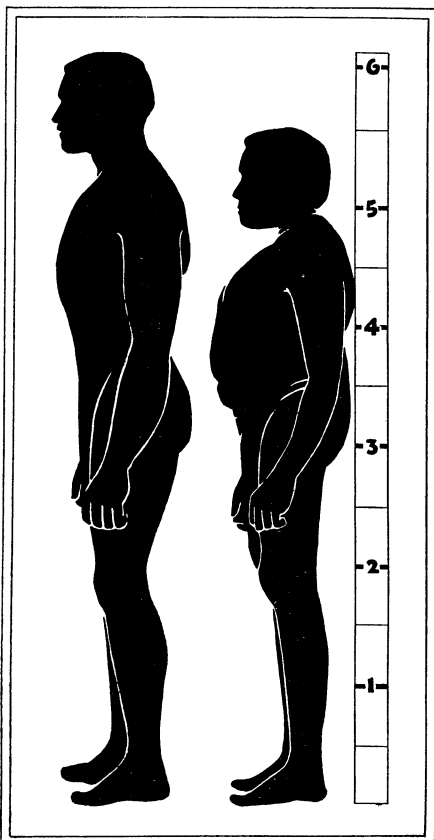
For four months at a time he lay stretched on a frame, trying to gain back some of the lost inches. The stretching apparently added half an inch to his height, bringing it up to five feet nine inches while he was lying in bed. However, when he was measured

after standing erect for half an hour, his height was only five feet six inches. Then he wore a supporting body brace.

At this time his neck had shortened, his head was sinking and his lower jaw had become deformed, protruding forward so that his teeth were out of alignment. X-ray pictures showed that the bone disease now involved all the bones in his body. He was put on diets containing large amounts of foods rich in the bone-building elements, calcium and phosphorus. Medicines containing these minerals, and in addition cod liver oil, thyroid extracts, adrenalin, light rays, quartz lamp treatment, and milk irradiated to increase its vitamin D content were tried. But he showed no improvement and almost all the time he was in the hospital he suffered from weakness and nearly constant pain in his bones and joints.

Transferred to Bellevue

After it became evident that he was suffering from a disease of the bones, he was transferred to Bellevue Hospital, where scientists of the Russell Sage Institute of Pathology, Drs. R. R. Hannon, E. Shorr, W. S. McClellan and E.



EFFECTS OF DISEASE

These silhouettes show how hyperparathyroidism distorts the body.

F. DuBois, began investigations of the chemistry of his body, which apparently had somehow become disordered. They observed changes in his blood chemistry and excretions similar to those previously observed in dogs when an active parathyroid gland extract was administered. This suggested to Dr. DuBois that the Captain was probably ill because of an excessive secretion of his parathyroid glands. When the Institute, a part of Cornell University, closed its laboratories for the summer, Captain Martell was sent to Massachusetts General Hospital in Boston where Harvard Medical School scientists, Drs. Joseph C. Aub, Walter Bauer, Fuller Albright, and Charles L. Short continued the investigations. They confirmed the findings observed by Dr. DuBois and his coworkers.

What had happened to weaken the young captain's bones so that they could no longer support the weight of his body but bent under the load until they were deformed? You probably think that after you have grown up and your bones have reached their adult size they normally undergo no further change. But medical scientists now consider bone an active tissue, something like skin and muscle, that is constantly being built up and broken down. Bone diseases, such as rickets and osteomalacia, are conditions in which the building-up process is faulty. The new tissues, instead of being normal bone, are deficient in lime salts. Lime or calcium is one of the elements that give bones their hardness.

Usually Caused By Diet

This condition may result from several causes. Malnutrition and lack of certain dietary factors such as vitamin D and calcium is one cause, resulting in rickets in children. Another cause is repeated bearing and nursing of children which may divert the calcium from the mother's system to her child's, leaving her with diseased and weakened bones. A third cause is disturbance of the glands of internal secretion, particularly the parathyroid glands.

Much of this knowledge about bone diseases and their causes was gained from investigations and experiments performed on dogs, guinea pigs and other laboratory animals. Captain Martell did not hesitate to join the ranks of experimental animals, letting the doctors treat him, operate on him and make test after test. When they wanted to stop after four operations, he threatened to leave the hospital and find another

where the proposed operations would be carried out. He fought his rare disease as he would pilot a disabled ship through a stormy sea, insisting that the doctors carry on their investigations, not so much to save himself as to add to medical knowledge.

But the dogs and guinea pigs and other non-human laboratory animals had done their part, too. Working with them, a Canadian investigator, Dr. J. B. Collip of McGill University, extracted the potent hormone of the parathyroid gland which he called parathormone. Parathormone, he found, relieved the agonizing cramps and convulsions of parathyroid tetany and saved the lives of animals after their parathyroids had been removed. Of course, if every scrap of parathyroid was cut out, doses of parathormone had to be repeated indefinitely to keep the animals alive.

Too Much is Bad

Dr. Collip then gave doses of parathormone to normal animals. Bone deformities, weakness of muscles, finally of the whole body, and brittleness of bones were among the symptoms that followed. Tests of blood and excretions indicated that more calcium was being lost than was being taken in by the animal. Consequently the new bone tissue being formed lacked the necessary lime salts to harden it, and the bones became thinner because lime salts were being excreted at so rapid a rate.

Tests and observations of Captain Martell showed that he had the same symptoms as these laboratory animals that were getting excessive amounts of parathormone. For a short time the Boston physicians gave Captain Martell parathormone. The effect was to increase the severity of his pain and other symptoms.

By this time, Dr. Bauer and his associates were convinced that their patient was suffering from overactive parathyroid glands, probably as the result of a parathyroid tumor. So they decided to remove by surgical operation the parathyroid tumor, if they should find one. At the first two operations one parathyroid gland was removed from each side. Examination of these glands showed them to be entirely normal. So two more operations were performed, the surgeon searching the right and left sides of the thyroid for a possible tumor, and even removing one lobe of this gland. There was no improvement in Captain Martell's condition as a result of these operations, and

by this time his physicians thought he had stood enough. With undaunted valor the young captain insisted that they go on. At his request three more operations were performed. At the fifth the surgeons searched the upper left neck region and at the sixth the upper right neck region.

Finally, at the seventh operation, the surgeons explored the upper middle part of the chest in front, known medically as the anterior mediastinum. There they found the tumor and removed it. So far as known, this is the first parathyroid tumor found in this location and successfully removed.

In describing this last operation, Dr. Bauer said:

"At this point we all felt that the Captain had had a sufficient number of operations, that his general condition was anything but good and that we were not justified in proceeding further. However, the Captain insisted that his mediastinum should be operated to see whether or not the tumor was present. He said that if it was not done at the Massachusetts General Hospital, he would have it done elsewhere. His requesting this operation meant that the first anterior mediastinotomy was done in searching for a parathyroid tumor and that the search was successful."

Too Late to Save Him

It was too late to save the brave captain. He lost his last fight, dying at the age of 36. But the knowledge gained through his rare courage has already enabled the physicians to find a similar tumor in a similar location in another patient. This patient had previously undergone two unsuccessful operations.

"Had it not been for our experience with Captain Charles Martell," Dr. Bauer commented, "this patient might have gone along for some years longer without the tumor being removed."

From their study of Captain Martell, the physicians have learned as much about this disease as they ordinarily would have from a dozen cases of the same disease, Dr. Bauer added. They now have complete knowledge of the symptoms and signs and chemical findings. As a result, he hopes that physicians throughout the world will realize that hyperparathyroidism is a distinct disease and that it is not even such a rare malady as has been supposed.

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BACTERIOLOGY

Bacteriophage Is On Border Between Chemical and Life

BACTERIOPHAGE, strange substance that preys on disease "germs" and destroys them, has become fairly well-known since the days when the French-Canadian scientist, Dr. F. d'Herelle, described it. Hopes ran high in the early days that the "germ-eater" would prove a true panacea for most if not all of the infectious diseases that plague mankind.

Popular accounts stressed this phase of the new substance. Less well-known is the hope held by scientists that study of the nature of bacteriophage may contribute to an understanding of the great mystery of life.

How knowledge of bacteriophage might answer or partially answer the question, What is life? is explained by Alice C. Evans of the U. S. National Institute of Health in Washington. Reporting some of her own investigations of bacteriophage to the journal, *Science*, Miss Evans takes occasion to point out the following:

"The study of bacteriophage promises to enlighten the philosophical consideration because it stands at the border line between catalytic chemical substances, on the one hand, and living matter, on the other.

"If bacteriophage be regarded as an enzyme it must be conceded that it is endowed with at least one of the attributes of living matter—a limited ability for adaptation to its environment.

"On the other hand, the minute size of the individual particles offers an ob-

stacle to the acceptance of the idea that they may be living organisms. It has been shown that they may be no larger than certain protein molecules. They are so small that ten or even a hundred billion individuals may exist in a cubic centimeter of broth which nevertheless remains as clear as crystal."

A cubic centimeter is about twenty drops of fluid.

Miss Evans' investigations were of a bacteriological nature and were concerned with bacteriophage that could destroy various kinds of streptococci, the organisms that cause such ailments as septic sore throat and scarlet fever. She found that sensitivity or resistance to several races of bacteriophage might be a means of identifying certain kinds of streptococci. Her studies also showed that, contrary to common belief, streptococcus bacteriophage is widely distributed, at least during the season when streptococcus infections are prevalent.

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PHYSIOLOGY

Overweight Men Healthier Than Are Underweights

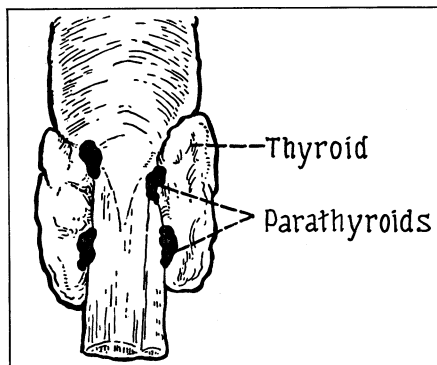
OVERWEIGHT young men have more physical endurance, greater resistance to infectious diseases, and are less likely to develop nervous or mental disorders than young men who are underweight.

These conclusions are drawn from a study of accepted entrants to the Royal Air Force and are reported by Dr. H. A. Treadgold, Group Captain, Royal Air Force, to *The Lancet*, British medical journal.

Dr. Treadgold compared the men's weights when they entered the Royal Air Force with their accomplishments in athletic competition and records of sick leave and invaliding from the Service.

"There is a definite relationship between varying degrees of body-build and functional efficiency, whether viewed from the points of capacity to endure severe or prolonged physical or mental stress or resistance to disease generally," he found.

"Capacity to endure severe or pro-



POWERFUL GLANDS

The tiny parathyroid glands, about the size of peas and located in the neck, have a tremendous influence on the body, particularly the bones.