Emil Theodor Kocher was born on August 25, 1841, in the capital of Switzerland, Bern. As the son of the chief engineer of the canton of Bern, Jakob Alexander Kocher, the young Kocher grew up in a peaceful, culturally sophisticated, and religious atmosphere. He was characterized as a quiet, unassuming, but sometimes mischievous boy. After finishing secondary school, he trained without interruption at the University of Bern, from which he graduated and obtained his doctorate in 1865 [1]. He started his surgical career after medical school in Bern, but his talent and purposefulness took him to advanced studies at academic centers such as Zurich, Berlin, London, Paris, and Vienna. There, he learned under famous teachers, including Hermann Askan Demme (1802–1867), Georg Albert Lücke (1829–1894), Theodor Billroth (1829–1894), and Bernhard von Langenbeck (1810–1887). As an associate professor, he returned to Bern, where he worked as a surgical assistant under Professor Georg Lücke. It was no surprise that in 1872 he was promoted to full professor of surgery; at this time, he also became director of the University Surgical Clinic in Bern as the position became vacant. He was only 31 years old when he was appointed to this job. He held the position until his death on July 27, 1917, 45 years later; this was an unprecedented feat. Even for those early years, selection as chair of a surgical department at age 31 was an outstanding honor. Whenever Kocher was invited to consider other lofty academic surgery positions around Europe, including Prague, Vienna, and Berlin, he deferred [2]. Throughout his career, he remained committed to his beloved hometown of Bern, where he found ideal conditions for his work. He was a humble man and reserved by nature; however, by report, he was very warm with patients, who uniformly loved him [3].

It was still very early in his medical and surgical career when Kocher described a new method for reducing shoulder dislocations and first received the attention of Theodor Billroth, who would become one of his critical mentors. Kocher intensively studied the pathologic anatomy of the shoulder and was then able to demonstrate his newly developed reduction technique on a patient with an old subcoracoid dislocation.
Kocher advanced the surgical procedure of pyloroplasty with subsequent gastroduodenostomy, this received attention in the field of ileus research. He published a comprehensive exposition, which has been of fundamental importance to the latter development of thyroid surgery as well as to other important areas of our knowledge of this gland. Through Kocher’s exposition, it became quite clear that complete extirpation of the thyroid is reprehensible. A portion of the gland which is capable of functioning must be left behind at the operation.”

While debate today continues about the relative merits of total thyroidectomy versus thyroid lobectomy, Kocher established the importance of not performing total thyroidectomy in an era prior to the evolution of exogenous thyroid hormone supplementation or replacement. But it was not just Kocher’s exposition about surgical approach that advanced the field of thyroidology forward, but also his studies into the causes of endemic occurrence of goiter in certain regions and into the cretinism connected with disturbances in thyroid function.”

The money he received for this prize (200,000 Swiss francs) was fully donated by him to his University (of Bern) to build a Research Institute for Biology. The Theodor Kocher Institute of the Medical Faculty of the University of Bern is active today, addressing molecular mechanisms involved in inflammation, with a special focus on studying immune cell migration during immune surveillance and inflammation [6].
In the 1850s, thyroid surgery was only performed for vital indications, as operative mortality rates were often higher than 40%. The principal reasons for fatal outcomes were uncontrollable bleeding and/or infectious complications. Indeed, in the early days, thyroid surgery was considered such a dangerous operation that it was prohibited in France. It is worth noting, for example, that Lücke, the predecessor of Kocher, operated on ten goiters from 1866 to 1872, and nine of his patients succumbed to complications from their surgeries. Many voices were raised against thyroidectomy, and thyroid surgery had a reputation for being a thankless, dangerous, and reckless pursuit [7]. Samuel Gross, a surgical contemporary of Kocher’s who worked in the USA, wrote in 1866:

If a surgeon should be so adventurous, or foolhardy, as to undertake thyroidectomy, I shall not envy him… Every step he takes will be environed with difficulty, every stroke of his knife will be followed by a torrent of blood, and lucky will it be for him if his victim lives long enough to enable him to finish his horrid butchery… No honest and sensible surgeon, it seems to me, would ever engage in it. [8]

Using advanced surgical techniques described by Kocher and Billroth, in particular, the mortality rate was significantly reduced over the coming years. Kocher’s first paper on thyroid gland pathology and surgery in 1874 reported his series of 13 patients, and only 2 of these patients died. He described a technique where he first ligated the major arteries and veins to the thyroid gland; in turn, he identified the recurrent laryngeal nerve. After achieving this control, the external capsule of the gland was split, and the isthmus was removed. This helped to avoid profuse bleeding and spared the recurrent laryngeal nerves [3]. Most of the surgeries were performed under ether anesthesia and using local infiltration of cocaine. Kocher reported his surgical mortality rate in 1883 at the German Congress of Surgery; by that time, he had performed 101 goiter operations with an associated mortality rate of only 13%, which was groundbreaking for his time. In this surgical series, 18 patients developed the typical presentation of myxedema and altered mental status; all of this subset had undergone total thyroidectomy. Kocher closely followed his patients in the postoperative setting, and he found that those who underwent total thyroidectomy died within 7 years after surgery. Patients who underwent intended total thyroidectomy but who did not die were seen to develop a new, but smaller goiter. In autopsy studies, no thyroid tissue was found in the patients who died. This led Kocher to describe the cretinoid pattern, which he named “cachexia strumipriva”; this was first thought to be related to chronic asphyxia due to damage to the trachea and only later related to profound hypothyroidism [1]. In 1893, Kocher reported that ingestion of raw thyroid tissue could improve the severe symptoms of “cachexia strumipriva,” and others subsequently confirmed this finding. In turn, Kocher changed his earlier view that the thyroid gland’s main purpose was just to regulate blood flow to the brain [9].

In 1889, Kocher published a series of 250 goiter resections and described precisely the surgical procedure he called “enucleation resection,” including the typical transverse collar incision of the skin; today, this is still referred to as a Kocher incision. He also described why it is necessary to leave a minimum amount of healthy thyroid tissue behind to allow for continued thyroid function, and why it is essential to preserve the function of the recurrent laryngeal nerves as well as the parathyroid glands. However, in Kocher’s time, the function of the parathyroid glands was still unknown. For many years, the Kocher operation (advocating for less than total thyroidectomy) was standard of care; only recently has there been a shift toward total thyroidectomy for the purpose of reduced risk of recurrence. Only with the later development of exogenous thyroid hormone supplementation and replacement has total thyroidectomy been rendered safe.

Tetany and hypoparathyroidism were not yet understood in Kocher’s time, but his (relatively) bloodless technique permitted him to have fewer complications postoperatively compared to his contemporaries [1]. Kocher was renowned for his purposeful and precise style of performing thyroidectomy. With fastidious technique and integration of advanced antiseptic surgical methods, Kocher was able to reduce his perioperative mortality rate to 0.5% by 1912 [10]. By that time, he had performed more than 5000 thyroid operations, making him perhaps the earliest “high-volume” endocrine surgeon, and the first surgeon who demonstrated that with increasing experience, patient outcomes are optimized.

Kocher also was interested in the etiology of the development of goiters, and he performed a large study examining thousands of schoolchildren living in the canton of Bern; in this study, he described a total goiter prevalence rate that ranged from 20 to 100% [11]. He realized that there were significant geological differences regarding the prevalence of goiter and cretinism, and further studies focused on its etiology with the aim being to provide prophylaxis for the Swiss population. Shortly before his death, Kocher recommended that iodine supplementation be provided at a population level in order to prevent goiters. However, he was convinced at that time that iodine deficiency was not the cause of the development of goiters but rather an entity that could antagonize the real, unknown goitrogen. It was not until 1914 that thyroxine was identified by Kendall, and later, in 1926, first synthesized by Harrington in London.

Over the course of his career, Kocher published 249 scientific articles and books, operated on thousands of patients, and trained new generations of surgeons. His way of teach-
ing is still contemporary and has applications for the purpose of ensuring the highest quality surgical care. Fausto Chiesa summarized his strategy in an editorial around four points: (1) the importance of meticulous and repeated observations; (2) the knowledge of anatomy, pathology, and surgical techniques; (3) the accuracy, care, and patience that are necessary during surgical procedures (It is more important to be safe than fast!); and (4) the critical audit of results [12].

His fame and reputation as the first premier high-volume thyroid surgeon is robust today; rarely does a day go by when surgical trainees do not learn about the importance of the Kocher maneuver during pancreaticoduodenectomy, or perform a Kocher incision during thyroidectomy, or utilize or pass a Kocher clamp. His name and spirit continue to live in the city of Bern in the Theodor Kocher Institute, the Kocher Park (Fig. 1), Kochergasse (Fig. 2), as well as in two Kocher busts, one placed in front of his so loved Inselspital, the University Clinic of Bern (Fig. 3).

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References

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