

HISTORY OF TAIWAN RAILWAYS

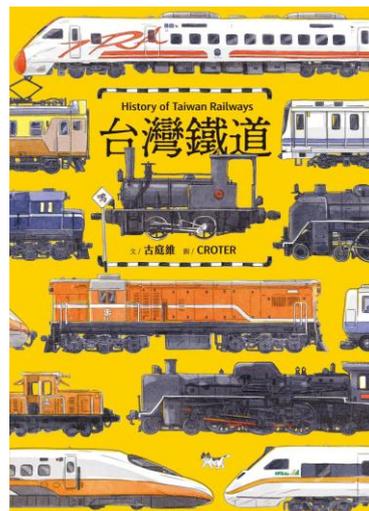
台灣鐵道

Railways are one of the most relied upon modes of transport in Taiwan. Using an engaging and easy-to-understand writing style, this book gives a comprehensive breakdown of how Taiwan's railways have developed over the course of history.

Taiwan's railways were first introduced during the nineteenth century and underwent significant planning and expansion during the Qing Dynasty, Japanese occupation, and under successive Taiwanese governments. The older structures gradually gave way to newer ones until the extensive network that we know today which covers the whole island was eventually completed. This book explores Taiwan's railways across various eras through nineteen different themes which are put into a broader international context, delving into the history from environmental, cultural, industrial, scientific, and technological perspectives.

The book begins with the origins of the railways and looks at how they were planned and constructed, as well as how the industrial railways were developed, highlighting that the network was a driving force in laying the foundation for Taiwan's modernization. However, just as Taiwan's railway entered its golden age, it also became Japan's southern base during World War II and was significantly damaged by Allied air raids. In the decades that followed, the train systems and equipment were continuously updated, but with the birth and popularity of Taiwan's mass transit system, some of the railway lines gradually fell into obscurity. Today they have become a historical asset for nostalgic culture, preserving the railway's former glory for future generations to explore.

History of Taiwan Railways presents the development spanning the last one hundred year from a holistic temporal perspective, using rigorously researched details to reconstruct historical scenes and a



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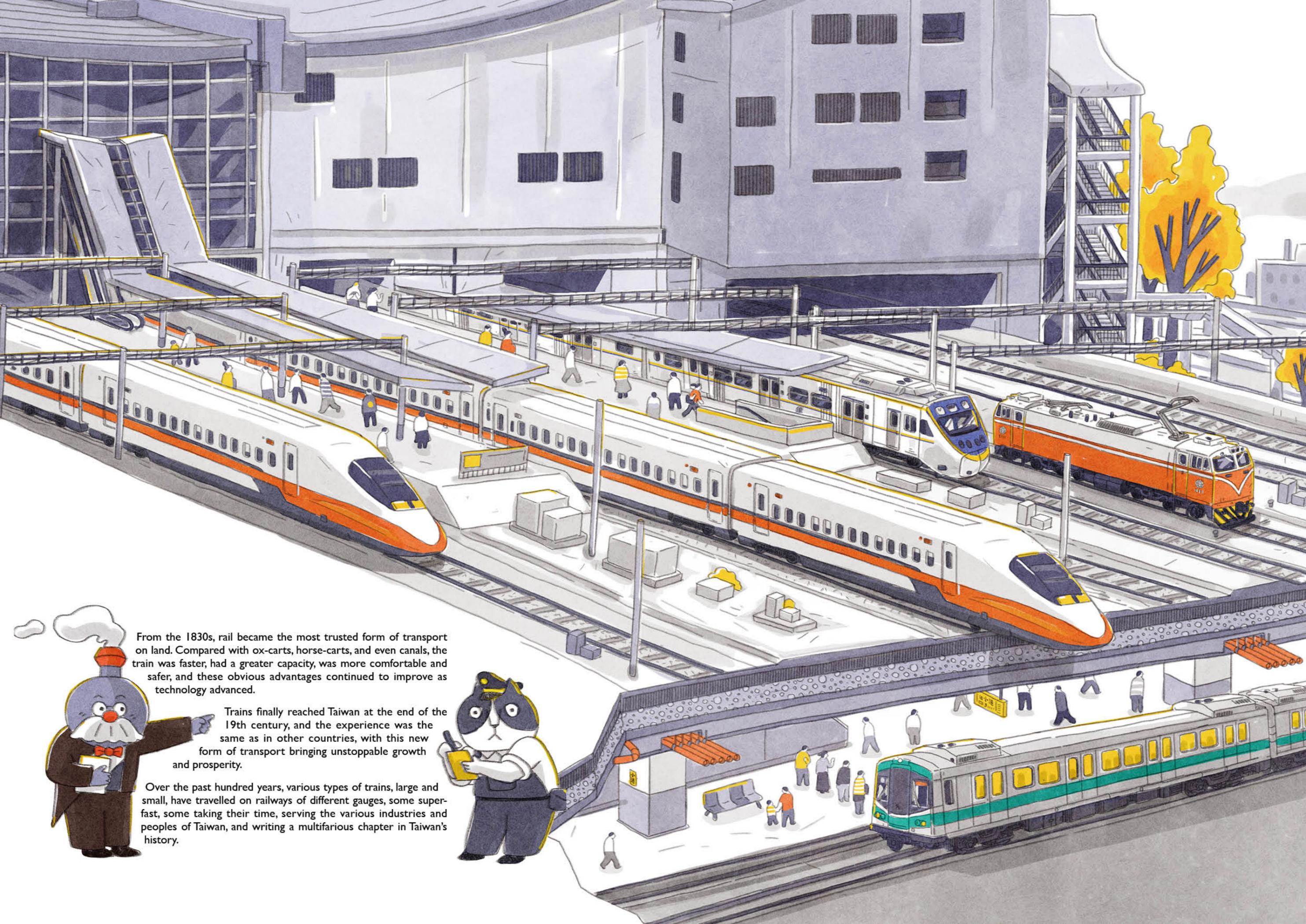
variety of different trains so that readers who want to understand Taiwan's railways can easily gain a comprehensive understanding of the subject.

Text by Ku Ting-Wei 古庭維

Born in Taipei in 1983, Ku Ting-Wei spent his childhood traveling between Taipei and Nantou, and has many memories of riding Taiwan's railways. He enjoys photography and hiking, and is currently editor-in-chief of *Rail News*, director of the Takao Railway Museum, and chairman of the Transport Heritage Society of Taiwan.

Illustrated by Croter Hung

Born in 1978, Croter Hung lives in Kaohsiung and is a designer and illustrator who began his independent creative career in 2004. His picture book *What Would Take You Away* with poet Miao Wang was selected for the BRAW Amazing Bookshelf (the top 100 titles entered for the Ragazzi Award) at the 2022 Bologna Book Fair and won the 2022 Golden Tripod Award for Book Illustration.



From the 1830s, rail became the most trusted form of transport on land. Compared with ox-carts, horse-carts, and even canals, the train was faster, had a greater capacity, was more comfortable and safer, and these obvious advantages continued to improve as technology advanced.

Trains finally reached Taiwan at the end of the 19th century, and the experience was the same as in other countries, with this new form of transport bringing unstoppable growth and prosperity.

Over the past hundred years, various types of trains, large and small, have travelled on railways of different gauges, some super-fast, some taking their time, serving the various industries and peoples of Taiwan, and writing a multifarious chapter in Taiwan's history.





The Origins of the Railways

Human beings have used tracks for travel and transportation for a long time, at first driven by manpower or animal power. After the steam train was invented, tracks became more like the ones we recognize today.

Six thousand years ago, before humans invented writing, they invented the wheel. Gradually, they added boxes or wooden planks, which meant they could carry goods. As time went by, people realized that if roads weren't good, it was difficult for carts to move smoothly, even if they were drawn by animals. About 2000 years ago, humans observed the marks made by cartwheels in mud roads, and discovered that it was easier to walk in the ruts. These were the earliest forms of "tracks". Archaeologists have found evidence of the use of tracks in almost every ancient civilization. Transportation along tracks advanced alongside human civilization. After the 15th century A.D., boardwalks and wooden tracks were developed in Europe. Mostly powered by horses, these were initially for engineering purposes, and later also took passengers.

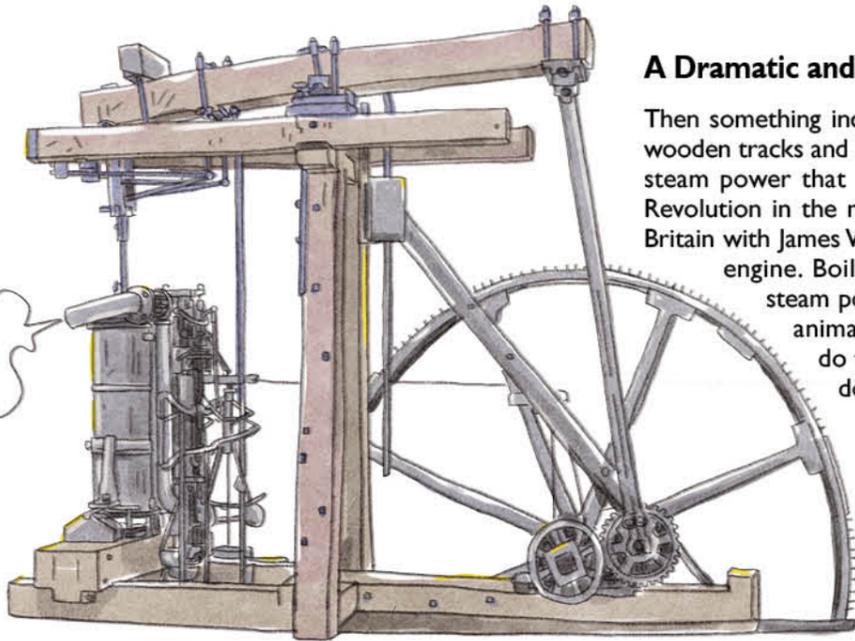


A Dramatic and Unprecedented Transformation

Then something incredible happened that transformed wooden tracks and animal power into the railways and steam power that we know so well: the Industrial Revolution in the mid-18th century. This started in Britain with James Watt's improvement of the steam engine. Boiling water produces steam, and steam power was stronger than human or animal power, and enabled humans to do things they had never been able to do before.



Watt

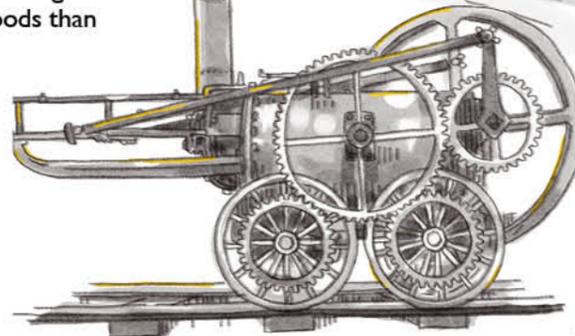


Watt's Steam Engine

After the Industrial Revolution, more coal was mined to provide fuel for the steam engines. Britain's iron mines and iron-making technology were the basis for these industries. The old ways of track transportation could not keep up with the new technology, and soon there were attempts at making iron tracks to carry more and heavier raw materials and goods. At the same time, inventors had the ingenious idea of combining the steam engine and cart, which enabled faster transportation of heavier goods than ever before, without the carrier getting tired.

The Appearance of the First Steam Train

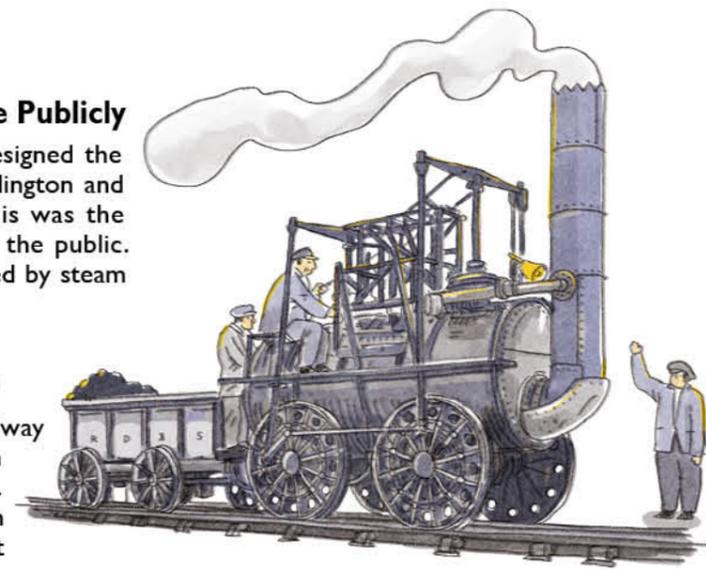
The Englishman Richard Trevithick fitted gears and other parts in order to transfer steam power to the wheels. On 21 February 1804, this peculiar machine made its maiden voyage, becoming the first steam train in the history of mankind. However, the poor quality of the tracks prevented the train from running.



The Steam Locomotive "Coalbrookdale"

The First Steam-Powered Railway to Operate Publicly

Years later, another Englishman, George Stephenson designed the "Locomotion" steam train, which was used on the Darlington and Stockton Railway in the English Midlands in 1825. This was the world's first steam-powered railway that was open to the public. It is interesting that at the time not all trains were pulled by steam trains; many were still horse-drawn.



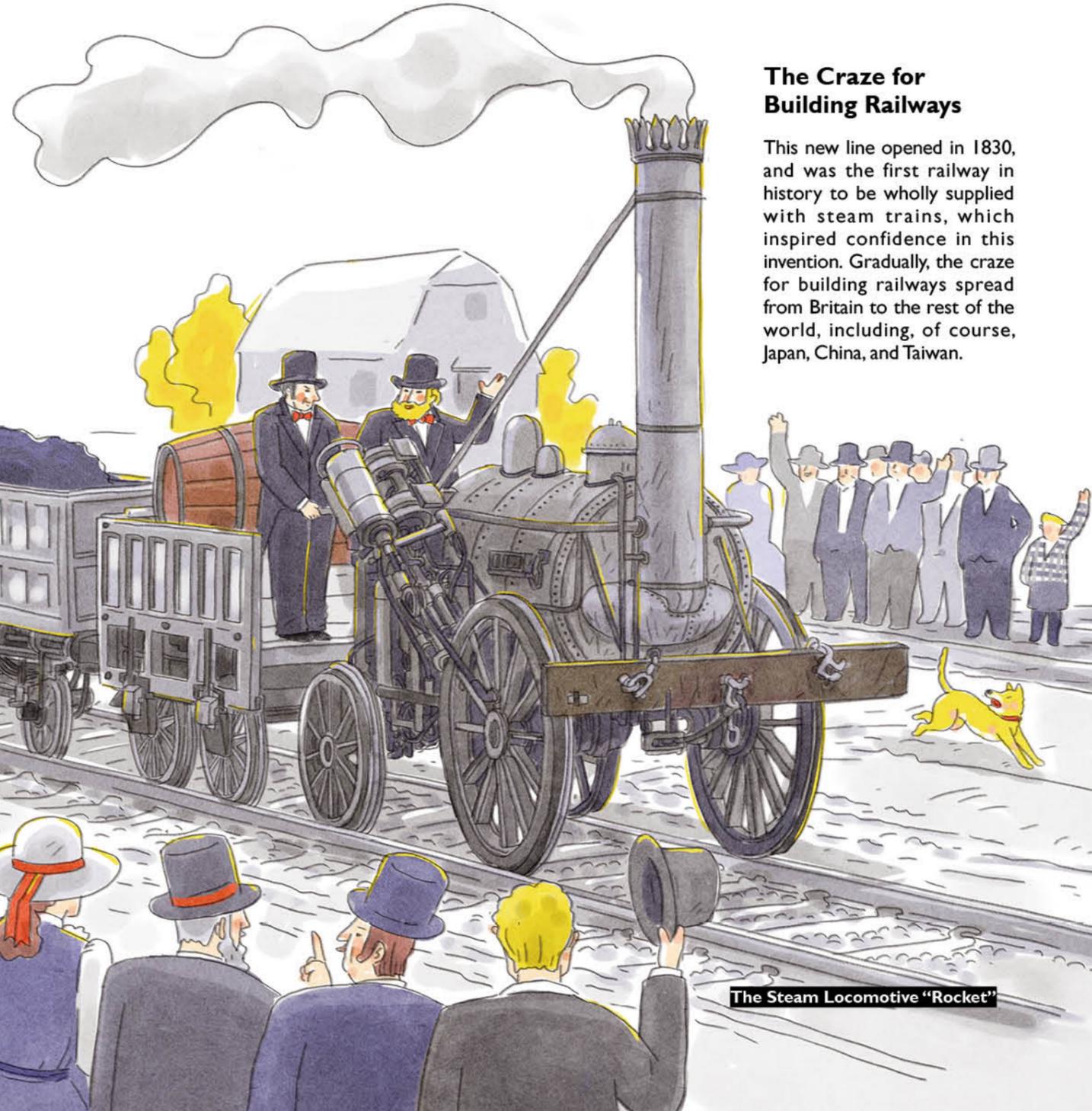
The Steam Locomotive "Locomotion"

The First Railway to Use Only Steam Trains

A few years later, the Liverpool and Manchester Railway Company held a competition to select the best steam train for use on its new line that was about to open. Stephenson's Rocket came out on top. The Rocket, in many ways, became the prototype for all subsequent steam trains.

The Craze for Building Railways

This new line opened in 1830, and was the first railway in history to be wholly supplied with steam trains, which inspired confidence in this invention. Gradually, the craze for building railways spread from Britain to the rest of the world, including, of course, Japan, China, and Taiwan.



The Steam Locomotive "Rocket"

Railways in Taiwan in the Qing Dynasty

In the early 19th century, about 50 years after the railway construction boom had started in Britain, it finally began to have an impact on the Qing empire. With the state in decline, imperial ministers looked to western "high tech" construction as the salvation of the nation, which of course included the steam train and the construction of train tracks. In 1885, after the end of the Sino-French War, Taiwan's position grew ever more important, which led to many cutting-edge construction projects being implemented first in Taiwan.

- 1888
- 1891
- 1893

Taiwan's first steam train, the German-made Teng-Yung, arrived in Taiwan. The line from Taipei Dadaocheng to Keelung port opened. Trains reached as far as Hsinchu. The governor Shao Youlian thought the railway project – the technology and the cost – was too heavy a burden, and decided to stop construction of the railways, so the train stopped at Hsinchu.



Establishment of the General Administration of Railway Commerce in Taiwan

The construction of Taiwan's railways was not originally intended for passenger use. In 1876, in order to develop the coal mines at Badouzi, the Qing government built lightweight tracks outside the pits, and used platform cars to take the coal to the port, where it was loaded onto ships. The planning and construction of the first real steam-powered railway did not start until 1887. At that time, the northern part of Taiwan had just been through the Sino-French War, and Liu Mingchuan, the governor of Taiwan believed that the two most pressing needs were the development of military defence and commerce, and for these purposes it was essential to build a railway line between Keelung harbour to Tainan. Court approval was granted for this ambitious goal, and the General Administration of Railway Commerce in Taiwan was established.

Facing Enormous Challenge

For the Qing Empire at the end of the 19th century, railways were still a very new high-tech product. The planning and supervision of the construction of trains, the laying of sleepers and rails, the building of bridges and of tunnels through mountains had to rely on foreign technicians and suppliers. Furthermore, most parts of Taiwan were undeveloped, and in a pre-"Industrial Revolution" stage. In those circumstances, there were multiple levels of difficulty in building the railway.

The Tamsui River

Setting out from Taipei to Hsinchu meant crossing several large rivers, including the Tamsui River. Due to a lack of funds, most bridges were made of wood. Expensive iron bridges were only built over very wide stretches of water.

Dadaocheng

Dadaocheng was selected as the starting point of the railway because it was an important port on the Tamsui River, where imported materials and equipment could be unloaded.

Shiqiuling Tunnel

At the highest point of the line, was the 235-meter long Shiqiuling Tunnel through the mountains. Due to the poor geological conditions and the limited surveying techniques of that time, it took a lot of effort to open the tunnel.

The Bureau of Mechanical Engineering

An arsenal that also functioned as a train repair facility, this was the first modern chemical plant in Taiwan.

Keelung Port

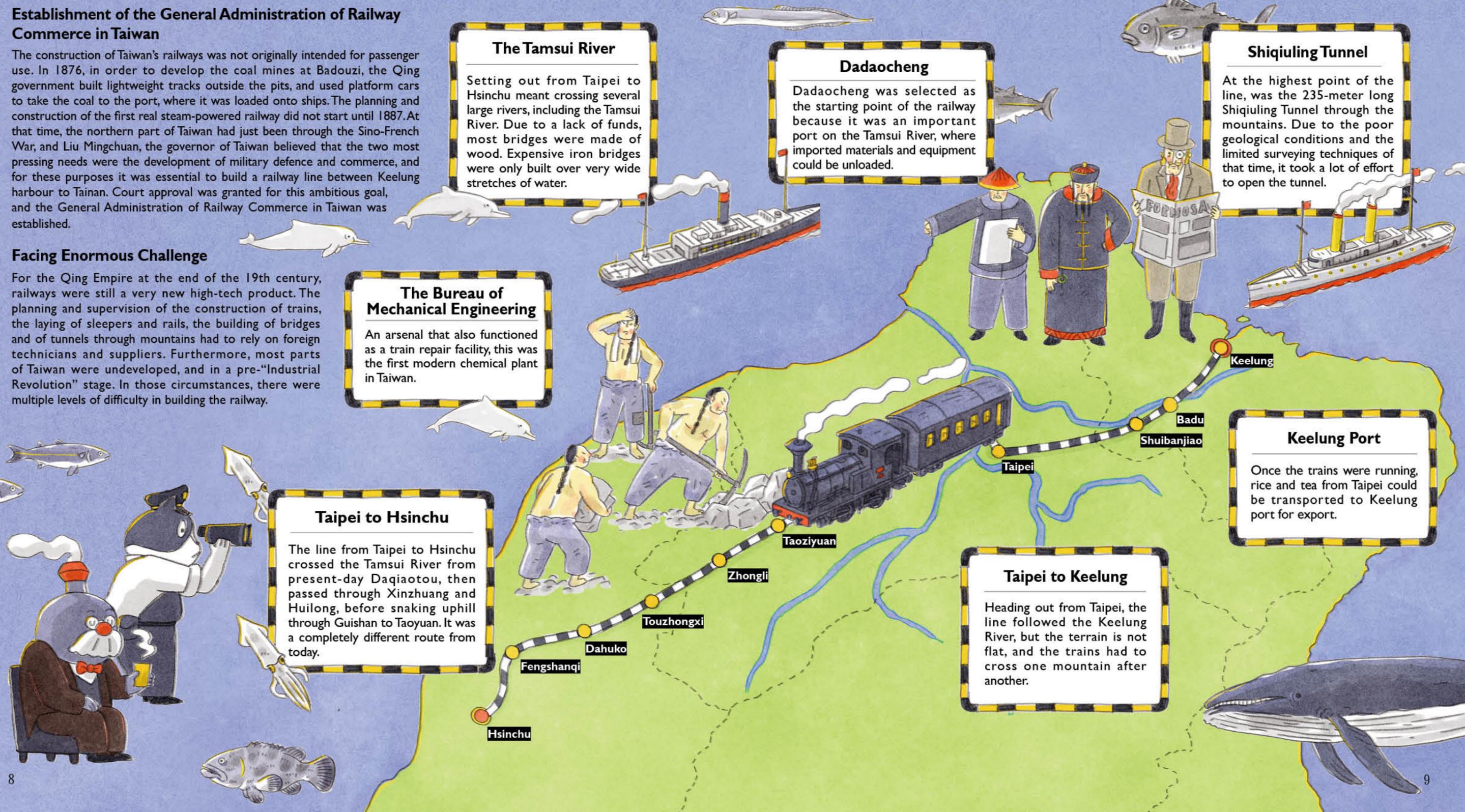
Once the trains were running, rice and tea from Taipei could be transported to Keelung port for export.

Taipei to Hsinchu

The line from Taipei to Hsinchu crossed the Tamsui River from present-day Daqiaotou, then passed through Xinzhuang and Huilong, before snaking uphill through Guishan to Taoyuan. It was a completely different route from today.

Taipei to Keelung

Heading out from Taipei, the line followed the Keelung River, but the terrain is not flat, and the trains had to cross one mountain after another.



Taiwan's Western Trunk Line

After the Sino-Japanese War, the Qing Dynasty ceded Taiwan and Penghu in perpetuity to Japan. After the Japanese army came to Taiwan, they did some railway prospecting in Keelung, but discovered that the locomotives, tracks, stations, and maintenance equipment were either damaged or lacked essential parts. The Japanese army had hoped to utilize this railway for transporting supplies from Keelung to Taipei, but in the end, it proved too difficult, and they had to mobilize dozens of people to slowly push the train forward. "Pushing the train" became a hot topic of conversation at that time.

Convenient Taiwan Vehicles Help First

In order to build and manage Taiwan, the transportation problem had to be solved. The army urgently laid a "light railway line" (LRL) through the western part of Taiwan, using human-powered light railcars to transport goods in the areas south of Hsinchu where there were no railroads. Although ordinary people could also ride or consign goods, this light railway line required a lot of manpower, so the transportation capacity was extremely limited.

Proportionally, the LRL was primarily for military use and could not be relied upon by the public or industry as a means of transportation. Reader, you might ask, "If there were no trains, couldn't they drive?" Unfortunately, even the most technologically advanced countries in Europe and the United States had only just introduced the most primitive automobile, and Taiwan not only lacked good railroads, but also lacked the modern roads that would allow cars to run steadily.

The Old Railway from Keelung to Hsinchu Receives a Facelift

In addition to the laying of new lines, the Western Trunk Line, including the parts from the Qing Dynasty, underwent renovation and reconstruction. The steep Shiqiuling Tunnel through the mountains was replaced by

the gentler Zhuziling mountain route. The line from Taipei to Taoyuan changed from the mountainous route from between Hsinchu and Guishan to go through Banqiao and Yingge. In fact, as the Qing Dynasty railway covered less than 10 kilometres of the route between Keelung and Hsinchu, it was basically a new construction.

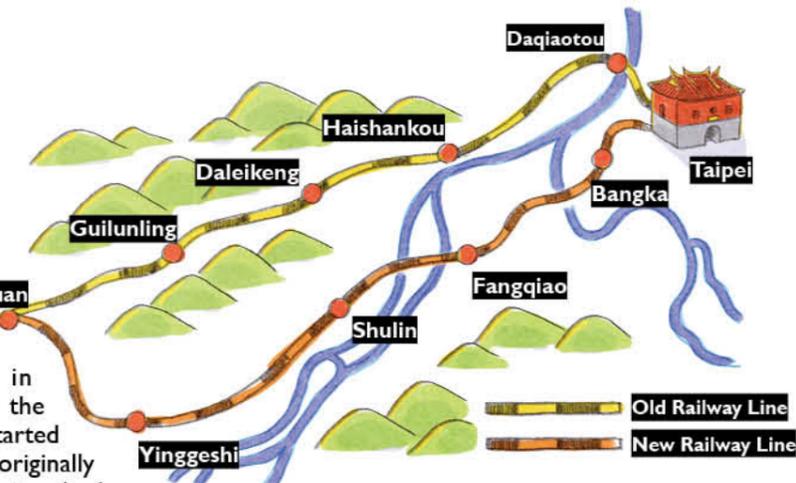
The Railway Work Heads South

While construction was underway on the line in northern Taiwan, a new line was being developed in the south. The southern end of the Western Trunk Line started not at Tainan or Anping port, as Liu Mingchuan had originally planned, but at the more southerly and potentially better harbour

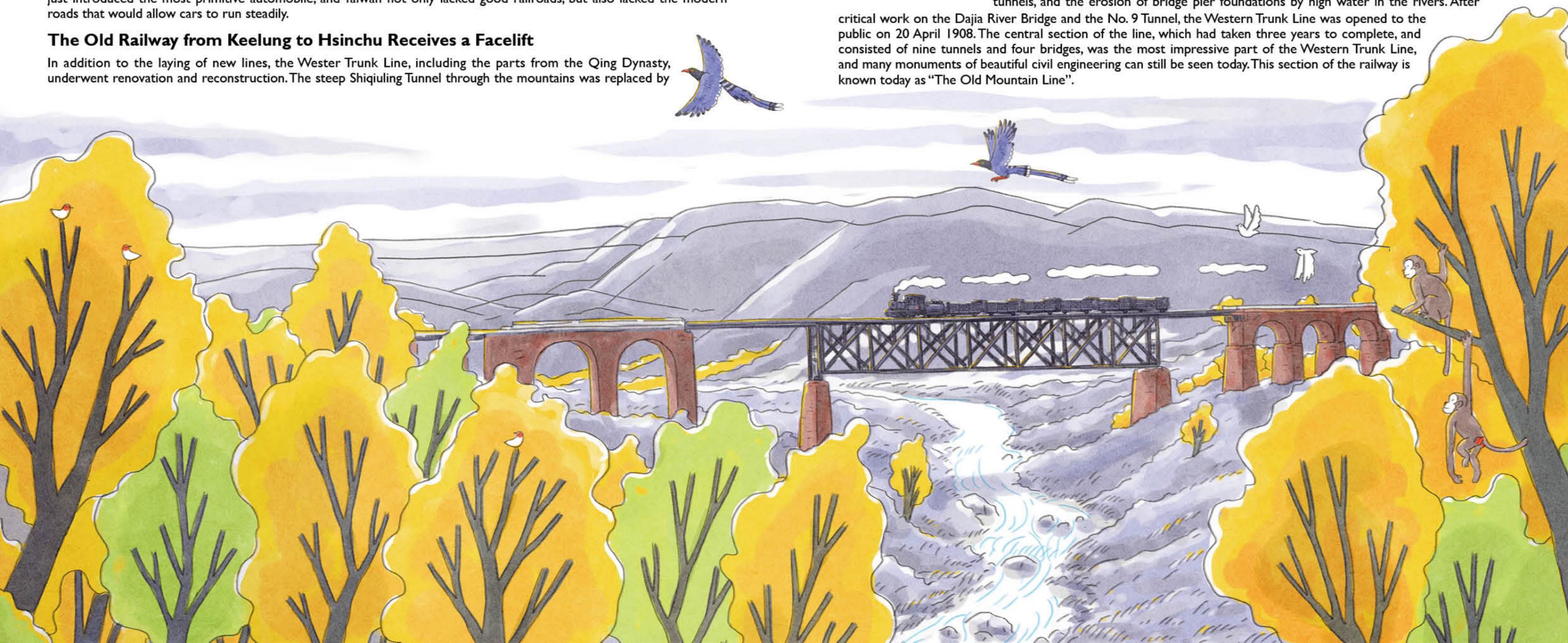
of Takao (modern-day Kaohsiung). On 29 November 1900, the line was officially opened between Takao and Tainan. It was the earliest section of the southern line in operation. Later, the line continued to be extended, crossing many wide stretches of water towards the north. The northern line also started in Hsinchu and continued southward, and by 1905, only two kilometres of the entire Western Trunk Line remained to be completed: the short section between Sanyi and Fengyuan. However, this was also the most difficult section. The railway had to cross a succession of mountains and rivers, and the soft ground made road-building and tunnelling more difficult. The lack of ports and roads in central Taiwan also made transportation of materials a major challenge.

The Western Trunk Line from Keelung to Kaohsiung Was Fully Open

Construction units overcame various disasters such as water surges and collapses in the tunnels, and the erosion of bridge pier foundations by high water in the rivers. After critical work on the Dajia River Bridge and the No. 9 Tunnel, the Western Trunk Line was opened to the public on 20 April 1908. The central section of the line, which had taken three years to complete, and consisted of nine tunnels and four bridges, was the most impressive part of the Western Trunk Line, and many monuments of beautiful civil engineering can still be seen today. This section of the railway is known today as "The Old Mountain Line".



Shiqiuling Tunnel

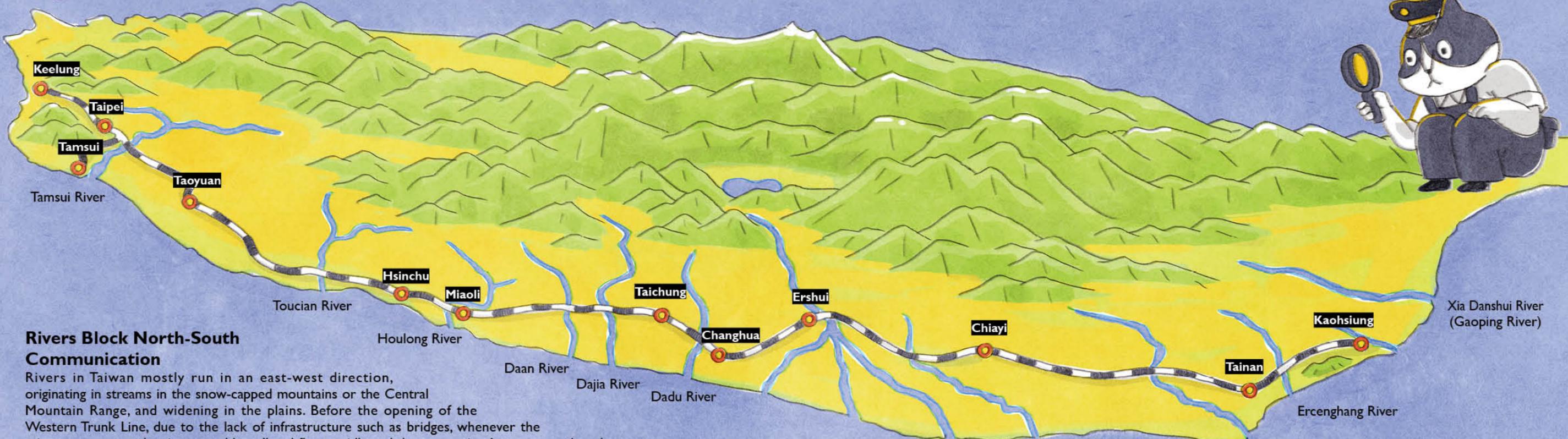




The Beginning and Foundation of Modernization

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Today it may be difficult for us to imagine that before the end of the 19th century, before there was a railway, the best way to get from Taipei to Tainan was to go by boat via Xiamen! With the completion of the Western Trunk Line running north-south, it became easier to move around the island, and industries from different parts of the island were able to develop in tandem with each other, sometimes combining land and sea, transporting goods and commodities by rail to the ports, and then exporting overseas.

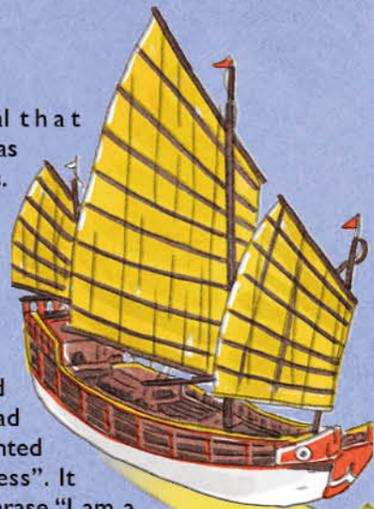
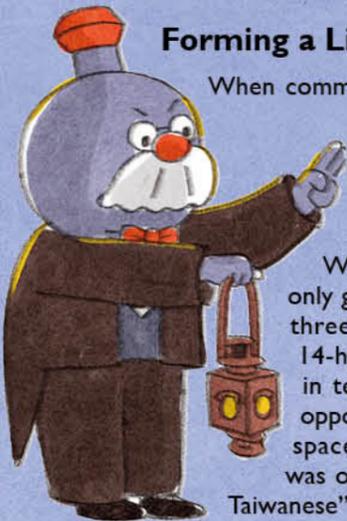


Rivers Block North-South Communication

Rivers in Taiwan mostly run in an east-west direction, originating in streams in the snow-capped mountains or the Central Mountain Range, and widening in the plains. Before the opening of the Western Trunk Line, due to the lack of infrastructure such as bridges, whenever the rainy season came, the rivers would swell and flow rapidly, and the connection between north and south would be completely cut off. Due to this natural environment, Taiwanese people were used to travelling in an east-west direction. Indeed, overseas trade was easier than on the island. Today, it is hard for us to imagine that in the late 19th century, when there were no railroads, the best way to get from Taipei to Tainan was to take a boat to Xiamen and then transfer to Tainan! Even in 1897, when Taiwan had its first regular shipping service along the west coast, it still took up to three days to travel from Taipei to Takao.

Forming a Living Area in the Interior of Taiwan

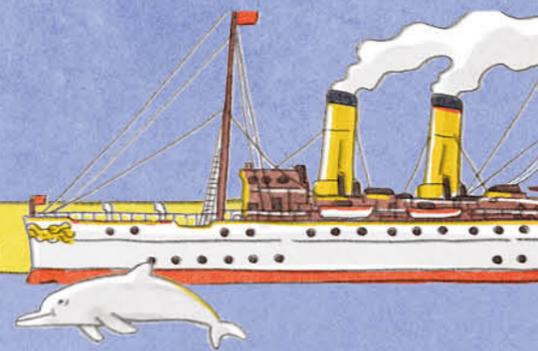
When communications north and south were obstructed, it was natural that habitation in the interior of Taiwan was limited, and there was relatively little interaction and exchange between regions. Although "Formosa" had been drawn on western maps for a long time, the inhabitants of the island of Taiwan may not have realized that they were part of Taiwan. The Western Trunk Line broke the sense of isolation that was not only geographical, but also psychological. What had been a bumpy three-day journey had been drastically reduced to a smooth 14-hour train ride. The impact was enormous, unprecedented in terms of time and space. People from all over the island had opportunities to travel between the north and south, the fragmented spaces became one, gradually creating a "Taiwan consciousness". It was only after the opening of the Western Trunk Line that the phrase "I am a Taiwanese" came into being.



To Xiamen



14 hours



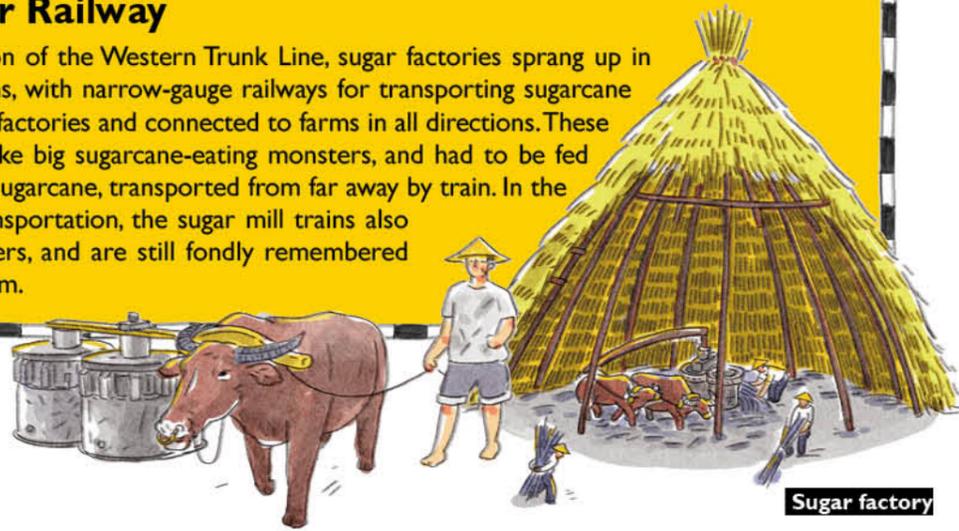
3 days

Great Strides Forward in Modernization

As movement in the interior of the island became easier, regional industries developed rapidly, using railways to transport goods and commodities to Keelung and Takao port for sale overseas. The significance of the opening of the Western Trunk Line in 1908 was not only a new choice of transportation, but also the starting point of Taiwan's development towards modernization, with time and space acting as the world's hands in shaping Taiwan's future for the next hundred years.

Taiwan's Sugar Railway

Following the extension of the Western Trunk Line, sugar factories sprang up in the southwestern plains, with narrow-gauge railways for transporting sugarcane centered on the sugar factories and connected to farms in all directions. These sugar factories were like big sugarcane-eating monsters, and had to be fed by a steady stream of sugarcane, transported from far away by train. In the days of poor road transportation, the sugar mill trains also carried some passengers, and are still fondly remembered by those who used them.



Sugar factory

From Brown Sugar to Granulated Sugar

In the early years of Taiwan's sugar production, sugarcane was juiced, then the juice was boiled and dried. At this stage, it was the old-fashioned brown sugar. The small factories that produced brown sugar were called "Sugar Mills", and the juicing process was quite primitive, usually using oxen to pull a heavy millstone. The granulated sugar we are familiar with today is made by bleaching the brown sugar and then separating the molasses, resulting in granulated sugar crystals with beautiful shapes and colours.

From Port to Sugar Factory

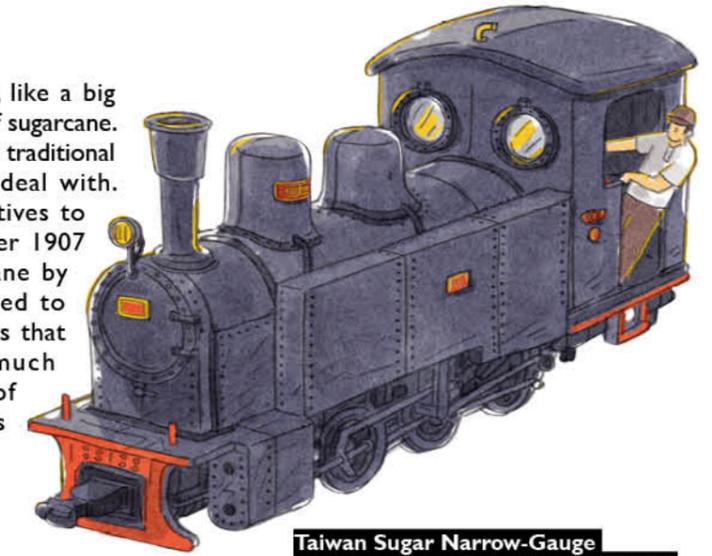
The integration of these processes is known as "New Style Sugar Manufacturing". The first new-style sugar factory in Taiwan was the Ciazhtou Sugar Factory, established in 1902. Its location was determined by the opening of the Western Trunk Line from Takao to Tainan in 1900. Imported construction materials, sugar making machinery and equipment could be transferred from the port to the train and then transported to Ciazhtou, where the sugar factory was located not far from the Western Trunk Line station. Sugar produced by the sugar factory was also transported to the port by the Western Trunk Line for export.

Different Gauges

Sugar factory production lines ran day in, day out, like a big sugarcane-eating monster that eats an endless supply of sugarcane. The amount of sugarcane consumed was too much for traditional oxcarts or human-powered light rail wagons to deal with.



Taiwan Sugar Passenger Train "Victory" (or "Shengli")



Taiwan Sugar Narrow-Gauge Locomotive made by Nippon Sharyo

Carrying Goods and Passengers

As the extension of the Western Trunk Line continued, other sugar factories were established in the Southwest Plains, and narrow-gauge railroad tracks for transporting sugarcane radiated from the sugar factories to the surrounding farms. Sugarcane processing also produced several byproducts: a filtrate that could be used as fertilizer, molasses that could be fermented to produce alcohol or monosodium glutamate, and bagasse that could be used to make paper or Medium Density Fireboard. All of these, as well as the sugar, could be transported on the sugar railways. In the past, when highway transportation was not well developed, the sugar factory trains also operated a passenger service, and people would crowd onto the trains to go to and from school, and those travelling further afield could take a small train, then transfer to the Western Trunk Line.

