into German between 1795 and 1797, while both Treviranus and Lamarck tackled the problem not merely of the theory of descent but of the mechanism of evolution. On this point the merits of Lamarck certainly outweigh those of his contemporary. Trevir­anus laid down as a fundamental proposition “that all living forms are the results of physical influences which are still in operation, and vary only in degree and direction.” Like many after him, he directed attention to the influence of the male elements in fertiliza­tion as a source of variation, but laid emphasis only on the intra- organismal power of adaptation to surroundings. Whatever opinion he entertained in regard to the priority and the importance of the contribution made by Treviranus to the theory of evolution, it is at least certain that he was a learned naturalist and an acute thinker. His most important later work of a synthetic nature was entitled *Erscheinungen und Gesetze des organischen Lebens* (1831).

See Evolution ; E. Haeckel's *Schöpfungsgeschichte,* pp. 83-5; Carus, *Geschichte der Zoologie,* p. 610.

TREVISO, a town of Italy, in the province of the same name, lies in the midst of a district of great fertility, at the confluence of the Piavesella with the Sile, which is here navigable for large boats and communicates by canals with the lagoons of Venice (17 miles distant). It is an old town, with narrow irregular colonnaded streets and some good squares. The cathedral of San Pietro, dating from 1141 and restored and enlarged in the 15th century by Pietro Lombardo, but still unfinished, contains a fine Annunciation by Titian (1519), an Adoration of the Shepherds, the masterpiece of Paris Bordone (born at Treviso in 1500), and frescos by Pordenone. There are numerous statues and reliefs by Pietro, Tullio, and Martino Lombardo, and by Sansovino. The Gothic church of San Niccolò (1310-52) contains a fine tomb by Tullio Lombardo, frescos by Giovanni Bellini, and a large altar-piece by Fra Marco Pensabene and others ; in the adjoining chapter-house are forty portraits of celebrated Dominicans by Tommaso da Modena (1352). The Monte di Pietà contains an Entomb­ment by Pordenone (according to others by Giorgione). The churches of S. Leonardo, S. Andrea, S. Maria Maggiore, and S. Maria Maddalena also contain precious art treasures, and the town is enriched besides by various open-air frescos. The town-hall and theatre are also conspicuous buildings. Silk and cotton goods, cutlery, majolica, and paper are the chief manufactures of the place, and an active trade is also carried on in corn, fruit, and cattle. The population in 1881 was 31,249.

Treviso, the ancient *Tarvisium,* is not mentioned by any of the ancient geographers, though Pliny speaks of the Silis as flowing “ex montibus Tarvisanis.” In the 6th century it appears as an important place. From 1318 it was for a short time the seat of a university (see Universities). In 1339 it came under the Venetian sway. In the 15th century its walls and ramparts were renewed under the direction of Fra Giocondo, two of the gates being built by the Lombardi. Treviso was taken in 1797 by the French under Mortier (duke of Treviso). In March 1848 the Austrian garrison was driven from the town by the revolutionary party, but in the follow­ing June the town was bombarded and compelled to capitulate.

TREVITHICK, Richard (1771-1833), inventor of the locomotive, was descended from a family of great antiquity in the county of Cornwall, and was born 13th April 1771, in the parish of Illogan. Shortly afterwards the family re­moved to Penponds, near Camborne, where the boy attended his first and only school, his attainments being limited to reading, writing, and arithmetic. Though slow and obstin­ate as a scholar, he spent much time drawing lines and figures on his slate, and possessed such instinctive skill in mechanics that while still a youth he was able to solve a difficulty in the correction of underground levels which had puzzled some of the mine agents. He inherited more than the average strength for which his family were famous, standing 6 feet 2 inches in height, while his frame was the very model of an athlete. His feats in wrestling and lift­ing and throwing weights were unexampled in the district. At the age of eighteen he began to assist his father as mine manager, and, manifesting great fertility of mechanical in­vention, was soon recognized as the great rival of Watt in improvements on the steam-engine (see vol. xxii. p. 476). On the death of his father in 1797, he succeeded him as leading engineer in Cornish mining. He married the same year. His earliest invention of importance was his improved plunger pole pump (1797), which has superseded all others for deep mining. In 1798 he applied the principle of the plunger pole pump to the construction of the water­pressure engine, which he subsequently improved in various ways. About this time he also perfected a high-pressure non-conducting steam-engine, which became a successful rival of the low-pressure steam-vacuum engine of Watt. At an early period he had begun experiments in the con­struction of locomotives, and a model constructed by him before 1800 is now in the South Kensington Museum. On Christmas eve 1801 his common road locomotive carried the first load of passengers ever conveyed by steam, and on 24th March 1802 he and Andrew Vivian applied for a patent for steam-engines in propelling carriages. In 1803 his locomotive was run in the streets of London, from Leather Lane by Gray’s Inn Lane and along Oxford Street to Paddington, the return journey being made by Islington. The cost was, however, found too great, and his thoughts were now directed to the construction of a steam loco­motive for tramways, with such success that in February 1804 he worked a tramroad locomotive in Wales, running with facility up and down inclines of 1 in 50. In 1808 he constructed a circular railway in London near Euston Square, on which the public were carried at the rate of twelve or fifteen miles an hour round curves of 50 or 100 feet radius. The ideas of Trevithick were successfully developed by Stephenson so as to revolutionize the system of modern travelling, but Trevithick had made consider­able progress towards this before Stephenson had begun his experiments. Trevithick applied his high-pressure engine with great success to rock boring and breaking, as well as to dredging. In 1806 he entered into a twenty- one years’ engagement with the board of Trinity House, London, to lift ballast from the bottom of the Thames, at the rate of 500,000 tons a year, for a payment of 6d. a ton. The following year he was appointed along with Vazie to execute the Thames driftway, but the work was abandoned owing to disputes about payment when unex­pected difficulties had occurred. He then set up work­shops at 72 Fore Street, Limehouse, for the construction of iron tanks and buoys and model iron ships. He was the first to recognize the importance of iron in the construction of large ships, and in various ways his ideas have also influenced the construction of steamboats. In the appli­cation of steam to agriculture the name of Trevithick occupies one of the chief places. A high-pressure steam threshing engine was erected by him in 1812 at Trewithen, the property of Sir Charles Hawkins, while, in the same year, in a letter to the Board of Agriculture, he stated his belief that every part of agriculture might be performed by steam, and that such a use of the steam-engine would “ double the population of the kingdom and make our markets the cheapest in the world.” In 1814 he entered on an agreement for the construction of engines for the Peruvian mines, and to superintend their working removed to Peru in 1816. Thence he went in 1822 to Costa Rica. He returned to England in 1827, and in 1828 petitioned parliament for a reward for his inventions, but without success. He was equally unsuccessful in his endeavours to induce the lords commissioners of the Admiralty to afford him facilities for demonstrating the value of certain improvements he claimed to have made in steam navigation. He died 22d April 1833.

See *Life of* *Richard Trevithick, with an Account of his Inventions,* by Francis Trevithick, C.E., 2 vols., 1872.