THE RAILWAYS OF THE HOLY LAND.

A MODERN INNOVATION IN AN ANCIENT LAND.

BY HAROLD J. SHEPSTONE.

GRADUALLY the Holy Land is being covered with a network of railroads, and to-day the screech of the locomotive may be heard not only in Jerusalem, but on the shores of the Sea of Galilee, in Nazareth, and in many other places associated with Biblical history.

in the world, although some people ignore the tradition that it was founded by one of Noah's sons. It has been the chief port of Jerusalem since Solomon landed his materials there for building the Temple. Leaving the city, the train plunges into the beautiful

Our course now lies across the plain of Lejed, when we begin to ascend what is known as the "hill country" to Judea. We pass to the left of Beth Shemesh, where the Ark rested, and are soon at the station at Deir Aban. Another hour and a quarter brings us to Bittir. According to Jewish history, this was a place of great strength. It contained four hundred synagogues, each of which boasted four hundred teachers. Here the Jews made their last stand against the Romans. The siege lasted over three years, and when the place fell it is recorded that 800,000 persons were slain.

Progress is so slow that it requires only an ordinary amount of activity to jump out, pick the flowers along the line, and rejoin the train as it laboriously moves up the steep incline. American tourists are fond of performing this feat. Jerusalem does not come into view until the train is quite close to the city. The first objects to meet the eye are the Tower of David and the city walls. The total ascent during the trip of fifty-five miles from the sea is not less than 2,600 feet. The line was built by the French at a cost of a little over \$3,000,000.

For many years this interesting railroad was the only one in the Holy Land. Now there are three others, comprising those from Beirut to Damascus, from Haifa round the Sea of Galilee to Damascus, and the Mecca or Hedjaz enterprise, which carries Mohammedan pilgrims from Damascus to Medina, the birthplace of Mohammed.

Beirut, on the Mediterranean, is by rail ninety-one miles from Damascus. The journey takes nine and a half hours. The railway is a narrow gage, and for climbing the mountainous portion (about twenty miles) a cogwheel and rack system is employed. Tourists making the journey invariably leave the train at El Mulakka, thirty-five miles from Beirut, and go by road to the ruins of Baalbek near by. This was once the most magnificent of Syrian cities, full of palaces, fountains, and beautiful monuments. Now it is famous only for its ruins, the most imposing of which are those of the Temple of the Sun. This railroad was also built by the French, and crossing as it does the Lebanon, passes through some really beautiful scenery.

The Haifa to Damascus line owes its inception to the Mecca railroad. When the latter work was put in hand, all materials for its construction had to be carried from Beirut to Damascus by the French railroad. The rates charged the Turkish government by this

ZIZEH, A STATION OF THE DAMASCUS AND MECCA RAILWAY NEAR MAAN. THE ONE FROM WHICH THE ROCK-Hewn CITY OF PETRA IS REACHED.

The first railroad to be opened in this historic land was that which runs from the seaport of Jaffa to Jerusalem. The distance by rail is fifty-five miles, and the journey occupies three hours and forty minutes. Often it takes much longer, and not infrequently travelers are five or six hours upon the road. By a curious arrangement, the trains only carry the Turkish mails, besides passengers; and the foreign post offices in Jerusalem have to bring their mails from Jaffa by horse-drawn wagons. Except in the height of the

and extensive orange groves in the richly cultivated plain of Sharon. Soon the modern village of Yasur is seen on our left. It was here, according to tradition, that Samson caught three hundred foxes. The first stopping place of any importance is Lydda, the site of Lod, which was built fourteen hundred years before Christ. Thirteen and a half miles from the terminus Ramleh is reached, the journey so far occupying an hour. It is the traditional site of Arimathea, mentioned by St. Matthew. In the town there is the old

JERUSALEM STATION OF THE JAFFA AND JERUSALEM RAILWAY.

WATER TANKS ON THE DAMASCUS AND MECCA RAILWAY NEAR ZIZEH.

THE RAILWAYS OF THE HOLY LAND.

tourist season, there is only one train a day, which leaves the seaport at 1:30 P. M.

As the steamers invariably arrive early in the morning, one is afforded an opportunity of seeing the city before proceeding to Jerusalem. Jaffa is at once picturesque and Oriental, with its clusters of palms and white flat-roofed houses. It is one of the oldest cities

Crusaders' church, now used as a mosque. Crossing the carriage road, we detect away to the left, on the top of a mountain, Neby Samuel, the Mizpeh of the Old Testament. It was at this spot that all the Children of Israel, from Dan to Beersheba, were called together several times. Saul, the first King of Israel, was chosen at Mizpeh.

line were so high, however, that it was decided to build this side line, giving them a direct communication with a seaport. The gage is 4½ feet, and it was built by English engineers. As the track runs across the Province of Galilee and touches many places mentioned in the New Testament, it is naturally much patronized by tourists.

Skirting along the foot of Mount Carmel, sacred to the Prophet Elijah, the railroad runs to Afuleh, close to Nazareth. This is the first stopping place of any importance. Nazareth to-day is a flourishing town of 10,000 inhabitants, the majority of whom are native Christians. It was originally intended to continue the railroad round the western shores of the lake. If this had been done, Tiberias, Magdala, and Capernaum would have been connected with the Mediterranean by rail. The engineers, however, finally decided to run the iron road round the southern end of the lake. The track passes through Semakh, at the southern

extremity of the Sea of Galilee, from which boats carry passengers across to Tiberias. From Semakh the line proceeds up the wild gorge of the Yarmuck, and thence to Daraa, where it joins the main line from Damascus. The Hedjaz project claims to be the only railroad built for the purpose of carrying pilgrims. Indeed, it is known as "The Railroad of the Pilgrims." Starting from Damascus, it runs almost due south through wild and sterile country for more than 820 miles to Medina. The rails used are of steel, and were imported from the United States, as were also the iron ties. The

rolling stock came from Belgium and Germany, the first-named country supplying the freight cars, and the latter the passenger cars. It was the deposed Sultan of Turkey who suggested the construction of this railroad, and the Turkish government handed over to the commission appointed to carry out the proposal, 17,000,000 unused postage stamps. These were sold by auction, in order to help finance the scheme. In passing it may be noted that the gage is one of 1.05 meters (3.445 feet). A trip over this railroad is an interesting experience. On leaving Damascus, the route enters what is known

A TRAIN COMING FROM THE SOUTH ON THE DAMASCUS AND MECCA RAILWAY.

DAMASCUS AND MECCA RAILWAY. TURKISH SOLDIERS WHO DO THE WORK OF CONSTRUCTION ALIGHTING FROM A BOX CAR OF A TRAIN.

AMMAN STATION ON THE DAMASCUS AND MECCA RAILWAY.

TRAIN AT RAYAK IN THE PLAIN OF THE BAACA BETWEEN THE LEBANON AND ANTI LEBANON ON THE BEIRUT AND DAMASCUS RAILWAY (NARROW GAGE) THE JUNCTION OF THE NEW RAILWAY (BROAD GAGE) RUNNING NORTH TO BAALBEK.

THE PLAIN OF ES-DRAELON ALONG WHOSE HISTORIC LENGTH RUNS THE NEW HAIFA AND DAMASCUS RAILWAY.

VIEW FROM MOUNT CARMEL OF HAIFA, THE STARTING POINT OF THE NEW HAIFA AND DAMASCUS RAILWAY.

THE RAILWAYS OF THE HOLY LAND.

as the Hauran. This is a vast plateau almost entirely devoted to the raising of wheat and barley, both of excellent quality. On the west is the snow-capped mountain of Hermon. The first station of any importance is Daraa. Here a large repair shop has been built for repairing disabled locomotives. The station also boasts of its restaurant, where good meals may be obtained. There is also a post office and an international telegraph office, where messages can be sent in any European language as well as in Arabic and Turkish.

At Daraa, of course, the line is joined by that coming up from Haifa. From this spot the Mecca railroad gradually ascends the undulating slopes of a plateau as far as Zerka, where it drops into a deep valley, and climbs out again by a winding ascent on to another small fertile belt. As the line proceeds southward, signs of civilization become fewer and fewer, and the sense of wild desolation more pronounced. Pursuing a course roughly parallel to the Jordan, and almost identical with the old caravan route, the railroad traverses a country which is full of history and romance to the religious mind—as much to the Christian as to the Mohammedan. Decayed ruins of a past civilization and silent monuments of a long-departed prosperity are visible on all sides.

At a point almost abreast of the Dead Sea the line enters a barren waste. A foot traveler passing through this region must be astonished at encountering the steel rails and telegraph poles which mean easy communication with distant but more hospitable districts. The interminable level of the sand is broken only on

the western horizon, where the mountains of Moab raise their peaks dimly into the heated air. For a considerable distance the going is easy enough from the engineering point of view. The valleys are wide and contain no steep grades; the engineer could pick his path and lay his iron road in such a manner as to minimize the work to be exacted from the locomotives. But in one respect the country is difficult; it is practically waterless. During construction every drop of water used by the army of workmen had to be conveyed by train from the nearest well—in some cases many miles away—and stored in carefully guarded tanks.

A journey of some 285 miles from Damascus, and Mahan or Maan el Hagj is reached. From this point about eight hours' horseback ride to the west brings one to the unique and fascinating ruins of Petra, and by means of the iron road the tourist of ordinary means is thus able to visit these hitherto inaccessible ruins. Mahan itself is now quite an important place on account of its hospital, hotel, repair shops, and other buildings, many of them substantially built of stone. The Turkish government has now established a garrison here. It is believed by some that in time to come Mahan will blossom forth as a health resort, since the air is very invigorating, despite frequent dust storms.

Southward of Mahan the line traverses high ground more desolate, if possible, than the country already crossed—certainly more rugged. So the journey continues until El Ula is reached, 609 miles from Damascus and 210 from Medina. In some respects this is

the most important station on the railroad. It is a little town of some 4,000 inhabitants, buried in the heart of the desert. It contains five hundred houses, and boasts copious springs and a thousand acres planted with date palms and cereals. The station, somewhat imposing and extensive, is the last depot north of Medina, and close to it are repair shops, engine sheds, and houses for the railroad staff. Beyond El Ula none but Mohammedans may go! Even the engineer-in-chief, who is a German, had to relegate to a Mohammedan assistant the carrying of the rails into Medina.

The railroad was mooted by the Sultan in 1900, and completed as far as Medina in 1908. It has been principally built by Turkish soldiers. Considering the immense physical difficulties to be overcome, this means the achievement of a remarkable engineering feat. Practically an unknown country had to be traversed, and all materials, stores, and provisions for the workmen had to be brought over the line from the seaboard. The road is certainly well and cheaply laid. The total cost for the Damascus and Haifa to Medina portion was only \$15,000,000, or about \$150,000 per mile. Now the Turkish government has declared its intention of carrying the rails into the holy city of Mecca itself. This will be no easy feat, as it means the laying of a track across the desert. When this project is completed, and the Bagdad railroad has progressed another 200 miles, and the Bosphorus has been spanned by a bridge, Mecca will be in direct communication with Constantinople. The illustrations are from photographs made by the American colony, Jerusalem.

HOW WOOD IS ARTIFICIALLY AGED.

THE COLORATION OF WOOD BY GASES AND FUMES.

BY H. WISLICENUS

THE current methods of preparing wood for the manufacture of furniture and similar articles are entirely superficial. The results are well known; the appearance of varnished, painted and stained articles which have been chipped, scratched or abraded, is anything but beautiful. To furniture and buildings constructed of naturally beautiful and unprepared wood, on the contrary, age brings a new beauty, and the indications of long use appear merely as evidences of durability and excellence. These fine old pieces are prized by the art historian and collector, and they often possess great artistic value, which is not disputed by any connoisseur, even though the particular style of the article may not agree with his individual taste or fit his peculiar surroundings. No such genuine artistic value can be conferred on wood by any of the superficial methods now employed. It is true that an artistic designer can produce striking and beautiful effects with bright stains and pigments, but in this process the wood itself loses in significance. When the object is to give an attractive appearance, temporarily, at least, to wood of inferior quality, such superficial staining, and covering with opaque pigments, have their usefulness and value.

Valuable objects of wood, however, are made to last for decades and even for centuries, and they are required to preserve their beauty longer than textile fabrics. Few of the current methods of treatment, and not one which employs synthetic dyes, can satisfy these demands, although there are many synthetic colors which are more permanent than the best of the old vegetable dye-stuffs. The wood is penetrated most deeply by colors dissolved in alcohol, but these colors are not the most permanent. Water colors penetrate only a small fraction of a millimeter into wood cut parallel to the grain, and the effect of turpentine and wax colors is still more superficial.

In order to stain the wood through its entire mass, it would be necessary to use great force and the elaborate apparatus which is required for the impregnation of wood with tar and other preservatives. Some such method has been employed in Austria, but not with complete success, for the process has a fundamental defect in addition to its great technical difficulty. To produce the proper effect it is necessary to impregnate the wood with the color before it is cut up, and consequently labor and costly dye-stuffs are wasted on sawdust, shavings and other refuse.

Wood impregnated with tar acquires a brown tint which is often very pleasing, but this method of coloring would not be suitable for articles of furniture, because the coloring matter of tar is not a true dye and possesses offensive odor. Treatment with the fumes of tar is unsatisfactory for the same reason. The so-called vapor is really a mist which does not penetrate wood any better than the liquid tar.

True vapors and gases, on the contrary, penetrate quickly into the innermost parts of the wood. For the coloration of wood in practice, only two such substances have been employed: superheated steam and ammonia. The latter gas produces various colors by its action upon substances contained in the wood, or intentionally added. The aqueous solution of ammonia has also been employed, but with less success. The coloration of wood by gases and fumes presents the following radical differences from the ordinary methods of dyeing and staining:

(1) In the coloration of wood by gases, dye-stuffs are not, as a rule, employed, and only small quantities of the gas or vapor are required to color the wood throughout. (2) In this method, therefore, the wood is not dyed or stained in the strict sense of the word, but is rather discolored by chemical change. (3) These chemical changes which, though conspicuous, are slight, take place in those unstable ingredients of the wood and sap which are removed in the process of cellulose manufacture for the very reason that they are so easily decomposed. They consist chiefly of substances of the tannin group, sugar, gum and other carbohydrates. Alkalies, ammonia and superheated steam darken all of these substances by partially decomposing them and forming the so-called "humin" bodies, which are brown in color. (4) Although gases and fumes possess the advantage of even and rapid penetration, they do not produce useful colorations without the aid of other influences, such as high temperature, light, and moisture, singly or in combination. The oxygen of the air promotes the action of ammonia and, conversely, ammonia accelerates oxidation or slow combustion. (5) The colors produced by the action of gases, especially ammonia, are dull and soft. This is no disadvantage, but rather the chief merit of this method, as these subdued colors have no startling or sensational effect, but give the impression of age and permanence. The production of such venerable hues throughout the mass of sawn wood is, therefore, the especial object of the treatment with gases and fumes. The pendulum of fashion has lately swung away from bright, artificial colors toward the employment of unstained wood, covered only with transparent glazes. This is an advantage in so far as it brings out the quality of the wood, but wood of the rarer sorts and beautiful specimens of wood of commoner sorts are very expensive.

Uncolored wood presents the further disadvantage that, although it may be partially protected from the effect of air and moisture by varnish or wax, both the wood and the varnish are affected by light and gradually discolored. A striking impression of genuineness and permanence is produced by the coloration which has been slowly acquired by the unpainted and unstained furniture and wood work of old farm-houses. Such ageing of wood requires too much time and we

are therefore led to endeavor to accelerate the natural process. The most effective method of doing this consists in the coloration of the whole mass of the wood by the action of gases and fumes, in connection with air and moisture.

Let us now examine, in detail, the action of gases upon wood.

(A) *The natural discoloration of wood exposed to the air.* All wood becomes discolored in the air and the action penetrates throughout the mass, though at an exceedingly slow rate. Often the surface soon shows a marked change, which is always due to the action of oxygen or ozone, in combination with light, heat and moisture, upon the less stable ingredients of the wood or sap. Dust, especially if it contains iron and fungi and bacteria, may also contribute to this coloration. The effect of light is purely superficial. The yellowing of wood pulp paper when exposed to light is well known. The effect appears to be chiefly due to the ultra-violet rays. We find always two color changes, occurring simultaneously or successively, a very slow coloration of the entire mass and a comparatively rapid and striking change in the color of the surface, which may become yellow, brown or gray. Old wooden houses in the higher Alps have acquired a brown color of rare beauty. These inimitable tints are found only at great elevations and especially amid snow and glaciers, where the intensity of the sun's rays and of the ultra-violet rays in particular is little weakened by atmospheric absorption. Wiesner asserts that especially beautiful colors are found near bodies of water and in damp forest valleys, but this luminous red-brown tint does not occur in similar localities in the lowlands. The writer has made certain observations which give some explanation of this remarkable phenomenon.

The wood is always gray on the weather side of the house, which is frequently exposed to rain and snow. The sunny side is more or less brown, according to age. In some houses hundreds of years old, the color is so dark in spots that it appears almost black in diffused daylight. The projecting ends of the floor beams are found actually carbonized or charred, in very old houses. A few years' exposure produces a light brown color, and still newer houses have a pale yellow tint. Two phenomena are found in all cases: a pure gray on the weather side and an entire removal of color above the stable doors and privy windows.

The boards exposed to the ammoniacal vapors of such places are as white as the whitewashed foundation walls. The brown coloration is evidently quite superficial and unstable, as it is easily and completely removed by the moist ammoniacal vapors. The bleached spot is surrounded by a dark ring, in which the color has either been accumulated or darkened by ammonia. Close examination of the bleached sur-