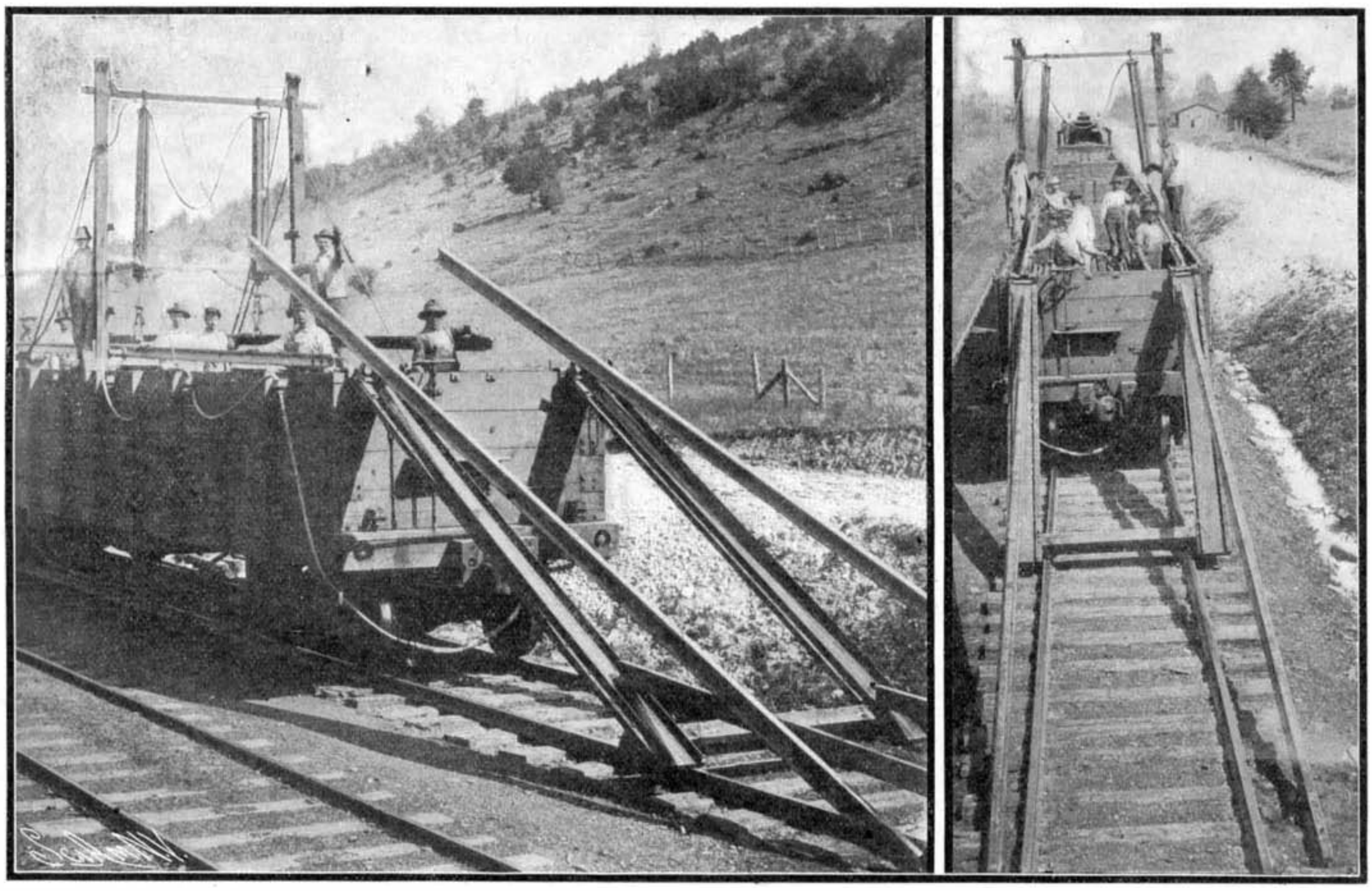
A PNEUMATIC RAIL UNLOADER.

It is the usual practice of rolling mills to ship rails in cars having sides and end-boards which are generally permanently secured. Indeed, much rail is shipped in deep, steel cars, so that it is impossible to remove the sides or ends for convenient unloading. For the purpose of meeting these conditions, Mr. Henry Ware, roadmaster of the Buffalo, Rochester and Pittsburg Railway, has especially designed a pneumatic rail-unloader which will undoubtedly be of interest.

The cars shown in the photographs are provided with permanent sides and end-boards, the inside measurement of which is four feet five inches high. From such cars it is not an easy matter to unload and distribute the heavy sections of rail now commonly used, even if it were possible to drop them over the sides of the car by hand—a bad practice which often results in serious damage to the rails. On the sides of the car a removable gallows frame is mounted, the uprights of which are secured directly to the sides by adjustable stake-pockets straddling the sides of the car, and by two adjustable brace-rods. The bottom of the uprights is so formed that they rest sufficiently on the top of the car to relieve all vertical strains on the pockets. By means of a vertical wedge the pocket is adjusted to fit any width or kind of car.



UNLOADING RAILS FROM A CAR WITH PNEUMATIC APPARATUS.

The longitudinal brace-rods are connected at the top by a hand bar from which two air-hoist-cylinders are hung. A skid-frame is hung from the end of the car, the two channel-shaped skids of which frame are connected at their lower ends by a cross-beam resting in lugs riveted to the skids. Each end of this cross-beam carries a small flanged wheel, which runs upon the track-rail. The head of each skid is provided with a roller in alinement with another roller on the inner side of the upright of the gallows frame. The piston rods of the hoists are equipped with rail tongs.

In operating this device four men are required to each cylinder, making eight men to unload two rails at the same time. One man is stationed at the cylinder, one at the tongs, and one at each end of the rail. When the rail is lifted to a sufficient height, the men guide it so that it will rest on the roller attached to the inside of the upright and on the roller on the head of the inclined skid attached to the end of the car. When the air is released and the tongs detached, the men start the rail on the roller toward the skid. The center of the rail having passed over the roller at the head of the incline, the rail tips up and slides to the ground. As the train moves on, the upper end of the rail gradually reaches the ground without any possible danger or damage. The men are not required to do any part of the lifting, that being effected entirely by pneumatic power, which is taken from the train air-brake line and is transmitted to the suspended cylinders through flexible hose.

This apparatus has been in use but a short time; still, it has fully demonstrated its practicability and usefulness. A great saving in the cost of handling the rails is effected; and the laborious work of unloading by hand is entirely avoided. With the present system of unloading rails by hand, from twenty to twenty-five men are needed to lift one rail out of the car. With this device only eight men are required to unload two rails at a time; and this is done in less than a quarter of the time ordinarily consumed in unloading one. Appliances in the form of steam and pneumatic carriages have been employed; but their use is attended with the objection that when one car is unloaded, the train is obliged to return to the siding, where a shift of cars must be made in order to bring the derrick next to the car to be unloaded. With Mr. Ware's apparatus, each car unloaded can be cut off from the train and allowed to stand on the track until driven to a siding by regular traffic.

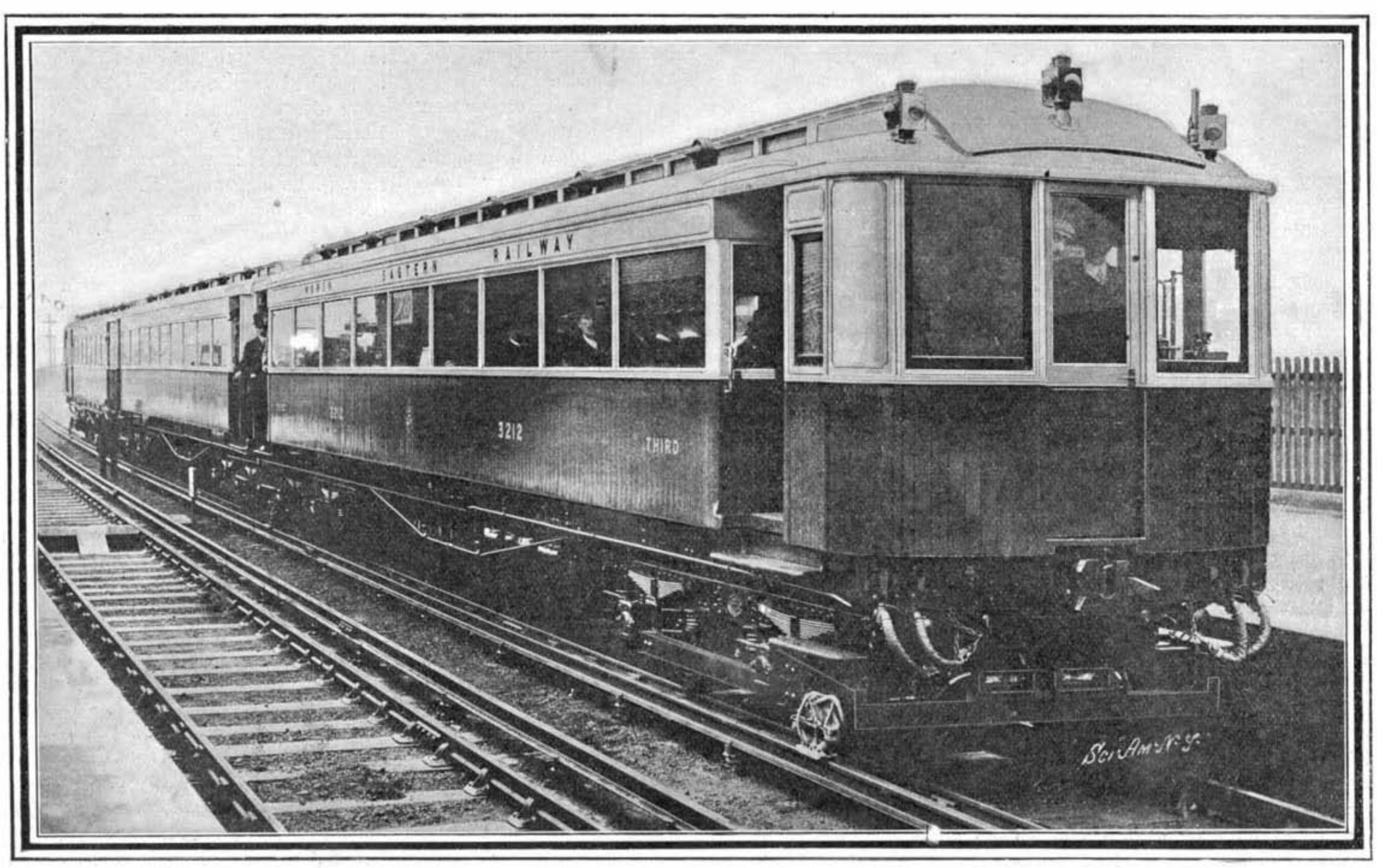
THE FIRST BRITISH STEAM RAILWAY TO ADOPT ELECTRICAL WORKING.

BY OUR LONDON CORRESPONDENT.

The forthcoming inauguration of the electrical working of the North-Eastern Railway is a very important event in British railway enterprise, because it is the first instance of one of the great railway companies replacing steam by electric traction. It is true that on the Mersey Railway electric trains have displaced the old steam-hauled trains, but this is only a very short line. The North-Eastern Railway is the first to grapple on a really large scale with the problem presented by the steady increase in working expenses and tramway competition. Another point of great interest in this scheme is the fact that Parsons steam turbines will be used exclusively in the new power house at Carville, to drive three-phase alternations, generating at 5,500 volts.

The engineering conditions to be met present features differing essentially from those prevailing in the electrification of a London tube railway, because some 37 miles of single, double, and four-line track are involved, and there are numerous junctions, crossovers, and other special track work. There is also a very heavy goods traffic to be provided for, which, except on the Quayside branch, will continue, at any rate for the present, to be dealt with by steam locomotives.

After careful examination of the advantages and cost of various systems it has been decided to operate the trains by continuous current obtained from a single collector rail placed in the six-foot way with a return circuit through the running rails. The current will be derived from rotary converters and static transformers which convert three-phase current at a pressure of 5,500 volts and periodicity of 40 into continuous current at a pressure of 600 volts. The collector rail will be of special high-conductivity steel, Vignoles section, 80 pounds per yard, carried on insulators composed of reconstructed granite placed outside the running rail and distant 3 feet 11½ inches from the center of the track. On double track the separate collector rails belonging to each track will be normally placed between the two tracks, but at junctions, crossings, etc., or wherever there is any obstruction in the six-foot way it can be transferred to



Forty miles of this steam road are now operated on the third-rail system.

INAUGURATION OF ELECTRIC TRACTION ON THE NORTH-EASTERN RAILWAY, ENGLAND.

the outside of the track as required. At level crossings, stations, etc., the collector rail will be protected by two creosoted boards bolted against distance pieces on each side of the rails. Under normal conditions the collector rails will have no protection, but holes for fixing this are being punched in all the collector rails, so that protecting boards may be readily applied at any place found desirable. Instead of adopting a second collector rail in the center of the track for the return current, as has been done in some cases, it was found that the Board of Trade requirements could be more economically met by bonding the running rails, but the position of the single collector rail has been so fixed that a return collector rail can be installed between the rails at any future time should this prove desirable in the event of great extension of the traffic on these lines.

ELECTRIC POWER SUPPLY.

Current will be supplied to the collector rail from five substations located at Pandon Dene, Wallsend, Cullercoats, Benton and Kenton. Fourteen 800-kilowatt rotary converters will be installed, distributed among the various substations so as to best meet the load. The substation containing the largest plant capacity will be Pandon Dene, where four of these rotaries will be installed. In order to meet the excessive fluctuations of the load each rotary has been specially designed to operate without serious sparking at an overload of 100 per cent for ten minutes and at an overload of 200 per cent momentarily. The main static transformers are of the single-phase, oil-insulated, self-cooling type. To each rotary converter is coupled a small induction motor fed by a special transformer, and the rotary converter is started up by means of the induction motor until it attains the synchronous speed of the rotary, when it is switched into the high tension busbars in the usual way. The substations will receive their supply of energy at a pressure of 5.500 volts, three-phase, through three-core, paper-insulated, lead-covered cables laid solid in wooden troughs along the railways.

The new rolling stock will comprise motor and trailer coaches, and will be of the open-corridor type, lighted and heated by electricity. Each motor coach will be equipped with two G. E. 66 motors, each rated at 150 horse power, both motors being carried on one bogie truck. The unit train will be composed of two motor coaches with one trailer coach between them, this being strengthened when necessary by the addition of another unit train. The motor coaches will have drivers' compartments at one end only, but a master controller will be fitted in the vestibule at the other end also, so that the coach may be driven from this end if necessary.

The ordinary accommodation train will take about 23 minutes for the journey from Newcastle to Tynemouth, the average speed being about 22 miles per hour, including stops. Express trains will reduce this time to 15 minutes.

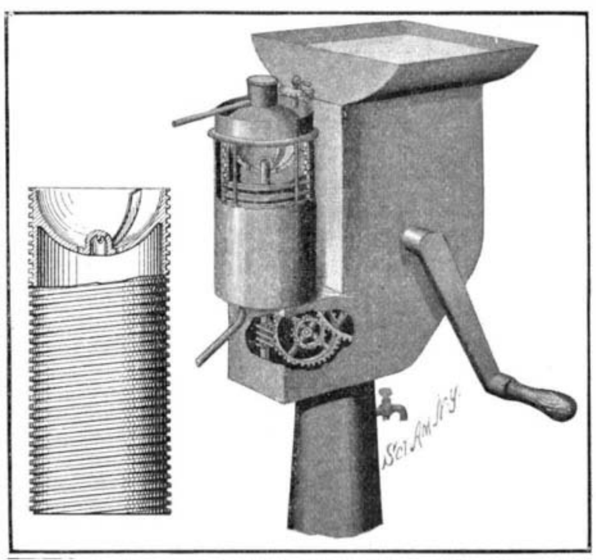
The Quayside branch line, which is used for freight only, is also being equipped for electrical operation, the object being to overcome the ventilation difficulties which now prevent the line from being fully utilized owing to its being for the most part in tunnels and on a heavy gradient. There will be two electric locomotives for the Quayside branch, and these will be equipped in the same way as the motor coaches with multiple unit controller, Westinghouse air brakes, etc. Each locomotive will be capable of starting with and hauling a train weighing 150 tons up a gradient of 1 in 27 at a speed from 9 to 10 miles per hour.

Instead of constructing a generating station of their own the railway company will purchase their current from the Newcastle-on-Tyne Electric Supply Company, Limited. A portion of this current will be generated at the existing Neptune Bank station at Wallsend, but this station is now nearly loaded up and the supply company have in course of erection a larger station situated at Carville, about half a mile further down the river, and it is from this new generating station that the bulk of the supply to the railway company will eventually be obtained. The designs for this new station are now completed and the contracts let. The generating plant is to consist of steam turbo generators, each of 3,500 kilowatts, with an overload capacity of 5,000 kilowatts for two hours, and the order for these has been obtained by Messrs. C. A. Parsons & Co. As the space occupied by such a set compared with that taken up by the boilers necessary to supply it with steam is so small, the usual arrangement of placing the boiler house parallel with the engine room has been abandoned, and instead each turbine unit will have a separate range of boilers running at right angles to the engine room. Every two ranges of boilers will be combined in one centrally-fired boiler house and will be provided with independent flues, economizers, induced-draft fans, and a short iron chimney.

Texas's unique star-shaped building at the World's Fair is receiving its staff ornamentation. Its peculiar shape and its great dome render it conspicuous among the State structures.

IMPROVED CREAM SEPARATOR.

An improved cream separator of the centrifugal type forms the subject of a patent recently granted to Mr. Henry H. Stüssy, of Beresford, So. Dak., Box 154. The invention embodies some novel ideas, which are very ingenious and interesting. The separator proper has been broken away in our illustration, to show the interior details, which comprise a stationary cylinder within which an inner cylinder is mounted to rotate. The stationary cylinder is formed with a dome-shaped top, opening into a small receptacle for the cream, which is tapped out into an outer chamber, and thence led off to any desired receptacle through the outlet pipe shown. The top of the rotary cylinder is closed by a bowl-shaped receptacle. On the outer surface of this cylinder a spiral groove is cut. Similarly, but in reverse direction, a groove is cut on the inner surface of the stationary cylinder. Milk is fed from a tank at the right into a trough above the separator cylinders, whence it is led through pipes to the space between the two cylinders near the bottom. The inner cylinder is rotated by a crank through a train of step-up gearing, which gives it a very rapid motion. The effect of this rapid rotation is to drive the cream by centrifugal action up the outer or stationary groove to the cream receptacle at the top, while the skimmed milk moves up the groove on the rotating cylinder and falls into the bowl-shaped receptacle. Two or more radial flanges in the bowl keep the liquid in motion, and assist in forcing the cream up the dome. The skimmed milk passes out of the bowl through small perforations therein, and is tapped out through a pipe at the bottom of the separator. The driving mechanism is inclosed in a box, the lower part of which serves as a reservoir for oil. Into this one of the wheels dips, and distributes the lubricant to the rest of the driving mechanism. The operating crank is connected with the train of gearing through a clutch consisting of a ratchet wheel



IMPROVED CREAM SEPARATOR.

and pawl, so that upon stopping the rotation of the crank, the separator may continue to operate under its own momentum.

The Radium Industry.

Notwithstanding the difficulty in its production (many tons of ore being required to produce 1 gramme), a radium industry has already developed in Germany and France, and although 1 gramme is sold at a little less than $2,000, the manufacturers are said to have orders for several hundred grammes.

The demand for medical purposes exceeds the supply. Radium possesses all the important qualities of the Roentgen rays in addition to the invaluable property of being ready for use at any time and furnishing its rays without the employment of apparatus. It has been demonstrated that a small glass tube, not larger than a goose quill, containing a little more than a thousandth part of a gramme, is as effective as an expensive and complicated electric apparatus for the treatment of cancer—surpassing the best effects of the Roentgen rays.

Automobile Notes.

In accordance with a suggestion from the Automobile Club of America, representatives of all the foreign automobile clubs, in a meeting at Paris, decided in favor of an amendment to rule 9, which will make it possible for drivers other than club members to run machines in the Gordon Bennett cup race of 1904. As a result, it is probable that Barney Oldfield and one or two other American chauffeurs who have made records in this country will pilot our cars, we hope, to victory on the course that has already been selected in Germany in the vicinity of Homburg. The race will probably be run some time between July 5 and 15, 1904.

The Paris automobile show opened with great *éclat* on December 10. It will last till the 23d, and will be followed next month by the New York show, which will last from the 16th till the 25th of January. One of the features of the French show is said to have been a 40-horsepower automobile train in which the power is supplied to all four wheels of each car. The train is said to have run from Paris to Versailles successfully. Another feature of the show was the Martini car in which Capt. Deasy made the ascent of the Rochers de Naye (as detailed in the current Supplement) last October. Not only the car, but portions of the cogwheel railway on which the ascent was made, were exhibited. The great increase in electric vehicles was one of the most noticeable things with regard to the show.

SIR OLIVER JOSEPH LODGE, F.R.S.

BY THE ENGLISH CORRESPONDENT OF THE SCIENTIFIC AMERICAN.

"A fine scientist with that rarest of gifts, a power of exposition commensurate with his great learning, and absolutely the kindest man to students who ever sat in an English chair of physics," is the graphic estimate of Sir Oliver Joseph Lodge, F.R.S., by one of his subsidiary co-operators—an estimate that is indorsed by every pupil and *savant* who ever came in contact with him. Prof. Oliver Lodge is now one of the foremost scientists of Great Britain, a pioneer in wireless telegraphy. In fact, it may be safely asserted that the present advanced condition of wireless telegraphy is due in no small measure to Prof. Lodge's numerous investigations and lucid descriptions of the phenomena of the Hertzian waves.

Sir Oliver Lodge was born on June 12, 1851. At fourteen years of age he entered his father's pottery business, where he remained for six or seven years. During this period, hard and incessant work throughout a long day left him but little time for recreation or the improvement of his education. One day he happened to pick up an old monthly number of the English Mechanic, and became deeply interested in its contents. This was his first acquaintance with science, for, as he states, he "never knew there was such a thing as science while at school." Perusal of this stray copy of a popular technical periodical deeply interested him. He continued his studies in a somewhat rhapsodical manner, picking up what bits of knowledge he could from articles in a penny encyclopedia, and attending lectures at the Wedgwood Institute in his native town.

While on a visit to London during his boyhood, he attended some stray classes on geology and other subjects at the King and University colleges, and also six lectures on heat delivered by Prof. Tyndall. The fascination of this subject was so great that young Lodge, as he himself remarks, "realized that he was a born physicist." Every minute of his spare time he devoted to the study of mathematics, physics, and chemistry, and by this means succeeded in matriculating at the University of London with honors in physics. He then studied chemistry under Frankland in the advanced laboratory at South Kensington, and for a session was a pupil of the late Prof. Huxley.

At twenty-one years of age he abandoned his father's successful business and studied mathematics at University College, under Henrici and Prof. W. K. Clifford, and physics under Prof. Carey Foster.

Three years later, in 1875, he took his B.Sc. degree and succeeded to the office of demonstrator of physics at the University, which fell vacant at this time. This year also signalized his first contribution to scientific literature, for he published, in conjunction with Prof. Carey Foster, several papers on the flow of electricity in a plane conductor, in which the forms of the lines of flow and equipotential lines are found practically and mathematically, for various shapes of conductors, and for different positions of the electrodes.

The following year he constructed a model which he exhibited before the British Association for the Advancement of Science. The object of this was to afford a mechanical demonstration of the passage of electricity through metals, electrolytics, and dielectrics, as theorized by Maxwell.

During the next few years Prof. Oliver Lodge was very prominent in the scientific world in connection with electric phenomena. In June, 1877, a paper was issued by him, in which he described a modification of the system advanced by Mance for the measurement of battery resistance. In this method he utilized a condenser for the purpose of supplementing the ordinary Wheatstone's bridge galvanometer, which was generally adopted in connection with this work. This contribution was followed by another valuable suggestion for a standard Voltaic cell. The feature of this latter device was the prevention of contact between the sulphate of copper solutions and the zinc rod. He advocated two ideas by which this end might be achieved. In one the sulphate solution was to be diffused through a long column of sulphate of zinc, and the alternative scheme was to employ a fine capillary layer of the latter substance, by means of which the two liquids might be brought into contact with one another.

Another great work was carried out by Prof. Lodge