industries. Every success that is achieved by the most advanced and sensational productions creates a demand for still further progress; and in meeting these demands, in the future, the race will be to the swift and the battle to the strong. The speed and the strength that you require in order to enable you to hold your own in this contest are speed and strength of intellect. In other words, you require your intelligence to be cultivated and well informed, and to be made prompt and active, by means of scientific culture; and it is necessary for you to acquire such a firm and comprehensive grasp of sound theoretical principles as will enable you to rely safely upon your own powers of judgment, and to act in difficult cases with certainty and precision. Not only does modern competition ever demand more from you in the way of technical knowledge, skill, and resource, but it also shortens the time at your disposal for supplying it. The huge and complicated engineering structures of the present day, such as are constructed in this district, have to be completed in as short a time as the much simpler and smaller ones of a generation ago. You have thus not only much more to think about in building a ship, and problems of greater number and difficulty to solve than used to be the case, but you have only the same time in which to do it all. You cannot afford to delay the progress of construction for the purpose of trying experiments or brooding over any difficulties you may meet with. It is necessary to decide promptly each question as it arises, and you have to qualify yourselves for doing that. The naval architect and engineer of the present day requires to supplement his practical knowledge by a close and systematic study of various branches of science. An enumeration of some of the chief of them will be sufficient to show how great are the demands thus made upon him. There are the laws upon which the flotation and stability of ships, and their behaviour among waves, depend; those which determine the structural strength of a vessel, and its relation to the forces which may be brought to bear upon her by her own weight and that of her cargo, when she is floating upon a changing wave-surface; the difficult problems connected with the resistance of a ship to motion through the water, the power requisite to drive her at a given speed, and the manner in which this is affected by her outward form and proportions. Then there is the wide field of thermal science, and its application to the means by which the conversion of heat into mechanical work is effected through the agencies of the boilers, cylinders, condenser, and mechanism of the engines; together with the action of the propeller, and the principles upon which its efficiency depends. No man has ever yet succeeded in completely mastering these difficult and complicated problems; and it is perhaps not possible for many of you to advance very far towards their solution. Still it must be borne in mind that it is only by studying the sciences which bear upon them that any real or substantial progress can be effected; and although finality may be unattainable, great advances are possible, and are constantly being made. Hardly a year passes without something considerable being done to improve our knowledge of those natural laws upon which the safety and efficiency of ships at sea depend. There is probably no district in this country which has benefited more in the past than Govan by scientific progress and great mechanical skill in shipbuilding and engineering, or whose prosperity in the future is more dependent upon it. Govan has been placed among the foremost of shipbuilding communities by means of great scientific and practical talent, industry, and enterprise; and it rests with many whom I now see before me to maintain it in the honourable and distinguished position to which it has been raised. The names of Napier and Elder, not to mention others, are alone sufficient to give prestige to any engineering locality; and they insure for Govan a high place in all future records of scientific, mechanical, and industrial progress. Upon you rests the responsibility of worthily walking in the footsteps of those and others among your distinguished men, and of striving to keep erect in this district the noble edifice they have reared."

SOCIETIES AND ACADEMIES

PARIS

Academy of Sciences, September 1.—M. Rolland, President, in the chair.—Some remarks on the subject of the theory of the figure of the planets, by M. F. Tisserand. The author's calculations and estimates of their present form are based on the assumption that the celestial bodies were originally in the fluid state, subject only to the mutual attraction of their constituent elements, and endowed with a rotatory movement with very slight angular velocity. Their outer surface would thus be somewhat that of a revolving ellipsoid.—Researches on the general development of vegetation in an annual plant: functions of the hydrocarbon elements, by MM. Berthelot and André.—Note on the general resolution of the linear equation in matrices of any order, by Prof. Sylvester.—Remarks on the attempts made at various times to solve the problem of aërial navigation, by M. Laussedat. The author supplies a rapid sketch of the progress of aërostatics in connection with the Commission lately appointed by the Academy to examine the claims of priority of various inventors. He considers that General Meusnier was the first to introduce the elongated shape of the balloon, the screw as the propelling agent, and the principle of the "*ballonnet*" or air-bag, rediscovered by M. Dupuy de Lôme. M. Conté is credited with great improvements in the construction of spherical balloons, and M. Alcan is stated to have anticipated M. H. Giffard by several years in the application of steam to aërial navigation.—Comparison between the coloured electro-chemical and thermal rings of Nobili and others, by M. C. Decharme.—Observations of the planet 240 discovered at the Observatory of Marseilles on August 27, 1884, by M. Borrelly.—Determination of the wave-lengths of the chief rays and bands of the infra-red solar spectrum, by M. Henri Becquerel. Tabulated results are given for the chief bands in millionths of millimetres.—Remarks on the formation and development of the nervous cellules in the spinal marrow of mammals, by M. W. Vignal.—Note on the recent luminous phenomena observed around the sun in Switzerland (second communication), by M. F. A. Forel. A second trip to the Alps, undertaken towards the end of August, enables the author to confirm and complete the details already communicated to the Academy. Aëronauts are invited to study some of these light-effects, and especially the red corona round the sun, scarcely perceptible from the plains and low elevations, but perfectly visible at altitudes of from 3000 to 6000 feet above the sea-level.—Account of the optical telegraph recently established between the islands of Mauritius and Réunion, by M. Bridet. The telegraph set up on Lacroix Peak in Réunion and Vert Peak in Mauritius was completed on the night of July 12–13, when messages were freely exchanged between the two islands.

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