owing to the sounding-wire having been entangled in the cross-rope by the twisting before it broke, the apparatus it carried was recovered. This apparatus consisted of an iron wire, to which were attached a number of metals of low fusibility, like antimony, zinc, &c., together with pieces of wood, india-rubber, sealing-wax, &c. By the melting, burning, or fusing of some of these, it was hoped to obtain a rough idea of the temperature. Above these came a small net, containing what was christened the "automatic chemical laboratory." This consisted of pieces of blue and red litmus-paper, Brazil-wood paper, and lead paper. With the assistance of my colleague, Dr. E. Divers, I had planned a number of chemical tests; but from previous experience I had learnt the impossibility of carrying out anything but the simplest of experiments when working on the summit of a live volcano.

At the second sounding, at a distance of about 100 feet from the edge, bottom (side?) was reached at 441 feet. The wire of metals, &c., came up without change, farther than the softening and bending of the sealing-wax. The automatic laboratory had a strong smell of the action of acid vapours. The blue litmus was turned red, and the lead paper was well darkened. Assuming the lead paper to have been blackened by sulphuretted hydrogen, then, as pointed out to me by Dr. Divers, the absence of this gas at the surface, and the presence of sulphurous acid, might be due to the decomposition of sulphuretted hydrogen by oxidation or by sulphurous acid in the presence of steam. The presence of sulphuretted hydrogen would indicate a relatively low temperature.

At the third sounding, the line, which was a copper wire, gave way at a depth of about 200 feet, carrying with it a mercurial weight thermometer and other apparatus which I had reserved for what I hoped to be the best sounding.

The fourth and last sounding was made, as measured on the guy-rope, at a distance of about 300 feet from the edge. In this case, the line, which was strong twine, after striking bottom when nearly 800 feet of it had run out suddenly became slack. On hauling up, 755 feet were recovered. The end of this line was thoroughly carbonised, and several feet were charred. Assuming that the guy-rope was paid out at an angle of 45°, we may conclude that the depth at this particular place was *at least* 700 feet. It is probable that the greatest depth is about 750 feet

A final experiment was to attach a stone to the end of the cross-rope, and then throw it into the crater, with the hope of hauling at least a portion of it up the almost perpendicular face on the other side. Unfortunately the line caught, and, in the endeavour to loosen it, it was broken.

Before we left the summit, we were very fortunate in obtaining views of one side of the bottom of the crater. This we did by cautiously crawling out upon an overhanging rock, and then, while lying on our stomachs, putting our heads over the edge. The perpendicular side opposite to us appeared to consist of thick horizontally-stratified bands of rock of a white colour. The bottom of the pit itself was white, and covered with boulders and debris. Small jets of steam were hissing from many places in the sides of the pit, while on our left, where we had been sounding, large volumes of choking vapours were surging up in angry clouds.

After this we descended the mountain, reaching our hotel at 8 p.m., after 15 hours' absence.

This concludes the narrative of a holiday excursion, partly undertaken with the object of making a few scientific observations. The results which were obtained are undoubtedly very few, while the labour which was expended and the risks which were incurred were very great. All that we did was to solve a problem chiefly of local interest, to learn a little about the nature of the gases which are given off by one of the most active volcanoes in this country, and to enjoy the spectacle of a phenomenon which it is the lot of very few to witness When a stranger gazes for the first time down upon the burnt and rugged sides of an apparently bottomless pit, which, while belching out enormous clouds of steam, roars and moans, he certainly receives an impression never to be forgotten.

The recorded eruptions of Asama took place in the years 687, 1124 or 1126, 1527, 1532, 1596, 1645, 1648, 1649, 1652, 1657, 1659, 1661, 1704, 1708, 1711, 1719, 1721, 1723, 1729, 1733, 1783, and 1869. This last eruption was feeble, but the eruption of 1783 was one of the most frightful on record. Rocks, from 40 to 80 feet in some of their dimensions, were hurtled through the air in all directions. Towns and villages were buried. One stone is said to have measured 264 by 120 feet. It fell in a river, and looked like an island. Records of this eruption are still to be seen, in the form of enormous blocks of stone scattered over the Oiwake plain, and in a lava-stream 63 kilometres in length.

JOHN MILNE

Tokio, October 10

THE MATHEMATICAL TRIPOS[1]

II.

VERY important regulations came into effect in 1848. The examination, as thus constituted, underwent no further alteration till 1873, and the first three days remain practically unchanged at the present time. The duration of the examination was extended from six to eight days, the first three days being assigned to the elementary and the last five to the higher parts of mathematics. After the first three days there was an interval of eight days (soon afterwards increased to ten), and at the end of this interval the Moderators and Examiners issued a list of those who had so acquitted themselves as to deserve mathematical honours. Only those whose names were contained in this list were admitted to the five days, and after the conclusion of the examination the Moderators and Examiners, taking into account the whole eight days, brought out the list arranged in order of merit. No provision was made for any further examination corresponding to the examination of the Brackets, which, though forming part of the previous scheme, had been discontinued for some time. A very important part of the scheme was the limitation, by a schedule, of the subjects of examination in the first three days, and of the manner in which the questions were to be answered; the methods of analytical geometry and differential calculus being excluded. In all the subjects contained in this schedule, examples and questions arising directly out of the propositions were to be introduced into the papers, in addition to the propositions themselves. Taking the whole eight days, the examination lasted $44\frac{1}{2}$ hours, 12 hours of which were devoted to problems.

In the same year as these regulations came into force, the Board of Mathematical Studies (consisting of the mathematical Professors and the Moderators and Examiners for the current and two preceding years) was constituted by the Senate. Although the new regulations had so strictly limited the subjects, and parts of the subjects, which could be set in the first three days, they had imposed no limitation whatever upon those which could be set in the last five days, the subjects of examination appearing in the schedule simply as pure mathematics and natural philosophy. Accordingly, the first matter to which the newly-constituted Board turned its attention was that of restricting the subjects on which questions should be set in the last five days of the examination.

It becomes necessary, therefore, at this point, to refer

[1] Address delivered before the London Mathematical Society by the President, Mr. J. W. L. Glaisher, M.A., F.R.S., on vacating the chair, November 11, 1886. Continued from p. 106.

briefly to the range of subjects which were included in the examination. Of the nature of the questions proposed prior to 1828, the first year in which all the papers were printed, very little can be known except what can be gathered from the problem papers and the specimens of the other papers that have been preserved;[1] but there can be no doubt that their character was determined by the ordinary Cambridge treatises then in use, which, it is well known, were far behind the corresponding treatises published on the Continent. Woodhouse's "Principles of Analytical Calculation" (1803), and "Plane and Spherical Trigonometry" (1809) are the earliest indications of the introduction of the analytical element into the mathematics of the University; a more decided impulse in this direction was given by the translation of Lacroix's "Differential and Integral Calculus" by Herschel, Peacock, and Babbage (1817), followed by Peacock's "Examples on the Differential and Integral Calculus," and Herschel's "Examples on the Calculus of Finite Differences" (1820).

The reform in the mathematical studies of the University which was effected by Herschel, Peacock, and Babbage, is well known. It is to them that we mainly owe the revival of mathematics in this country, and the restoration of intercourse with the rest of Europe after three-quarters of a century of isolation. Peacock was Moderator in 1817, and he ventured to introduce the symbol of differentiation into the examination, his colleague, however, retaining the old fluxional notation. The old system made its appearance once more in 1818, but in 1819 Peacock was Moderator again, with a colleague who shared his views, and the change was fully accomplished.

The introduction of the notation and language of the differential calculus into the Senate House examination forms an important landmark in the history of Cambridge mathematics. From that time onward the University began to make up slowly but surely the ground she had lost; step by step the analytical processes and methods superseded the older geometrical modes of treatment; and each year saw a substantial increase in the range of subjects included in the course of study.

Only second in importance to the revolution effected by the substitution of the differential for the fluxional calculus was the rise of analytical geometry in the first thirty years of the century; and, considering the amount of attention that this subject has received at Cambridge in the last fifty years, and the accessions that have been made in this country to the analytical theory of curves and surfaces, a peculiar interest attaches to the introduction into the University of the algebraic treatment of geometry and the early stages of its development. The first edition of Wood's "Algebra," which appeared in 1795, contained, as Part IV., a chapter of thirty pages "On the Application of Algebra to Geometry," in which are given the equations of the straight line, ellipse, cissoid, conchoid, and other curves, the construction of equations, &c. This chapter remained unchanged in the ninth edition (1830), and seems to have formed the only introduction to analytical geometry existing in the University until 1826, when Hamilton[2] published his "Principles of Analytical Geometry, designed for the use of Students in the University." This was not the first English treatise on analytical geometry, as Lardner's "Algebraic Geometry" was published, three years earlier, in 1823; but it was the first Cambridge book, and the first which included solid geometry. The problem papers from 1800 to 1820 show that at the beginning of the century analytical geometry was always represented to some extent, though scarcely as an independent subject, most of the questions relating to areas, loci, &c., in which but little more than the mode of representation by means of ordinates and abscissæ was involved. Hymers published his "Analytical Geometry of Three Dimensions" in 1830, and his "Conic Sections" in 1837. The latter at once superseded Hamilton's treatise, and remained the standard work on the subject for many years.

In applied mathematics the character of the questions proposed was largely influenced by the publication of Whewell's "Mechanics" (1819), Whewell's "Dynamics" (1823), Coddington's "Optics" (1823), Woodhouse's "Plane Astronomy" (1821-23), and Airy's "Tracts" (1826). A second edition of this last work, which appeared in 1831, contained a tract on the "Undulatory Theory of Light," a subject which was freely represented in the examination for many years. Not only were the questions modified, in character and range, by the publication of new mathematical treatises in the University, but they were also affected to a certain extent by some of the professorial lectures. At this time, too, the Smith's Prize examination exerted a beneficial effect upon the Senate House examination, certain classes of questions which were originally introduced into the former having shortly afterwards been admitted into the latter. Between 1830 and 1840, questions in definite integrals, Laplace's coefficients, electricity, magnetism, and heat were also introduced. There were no regulations of any kind, and the responsibility of introducing innovations and alterations rested solely with the Moderators and Examiners. The uncertainty as to the subjects that the examination would embrace, and the want of any due notice of any extension of them, were found to be serious inconveniences to the higher class of students, although, as has been already stated, the introduction of a new subject had been generally preceded by the publication of a work by a Cambridge mathematician, in which it was treated in a manner adapted to the examination.

The Board of Mathematical Studies was created by the Senate on October 31, 1848, and in May of the following year they issued a report to the Senate in which, after giving a short review of the past and existing state of mathematical studies in the University, they recommended that, considering the great number of subjects occupying the attention of the candidates and the doubt existing as to the range of subjects from which questions might be proposed, the mathematical theories of electricity, magnetism, and heat should not be admitted as subjects of examination. In the following year they issued a second report in which they recommended the omission of elliptic integrals, Laplace's coefficients, capillary attraction, the figure of the earth considered as heterogeneous, &c., besides certain limitations of the questions in lunar and planetary theory, &c. In making these recommendations the Board expressed their opinion that they were only giving definite form to what had become the practice in the examination, and were only putting before the candidates such results as they might themselves have deduced by the study of the Senate House papers of the last few years. The Board also recommended that the papers containing book-work and riders should be shortened.

From 1823 onwards, the examination was conducted in each year by four examiners—the two Moderators and the two Examiners, the Moderators of one year becoming as a matter of course the Examiners of the next. Thus of the four examiners in each year two had taken part in the examination of the previous year. The continuity of the examination was well kept up by this arrangement; but perhaps it had the effect of causing its traditions to be rather too punctiliously observed, the papers of each year being, as regards the subjects included, exact counterparts of the corresponding papers of the previous year. The resolutions of the Board in 1849-50 were not binding on the successive Moderators and Examiners up to 1872, but each year they seem to

[1] The problem papers were printed from 1779; but only those of the present century are accessible in the Cambridge University Calendars and other publications.
[2] Late Dean of Salisbury: born April 3, 1794; died February 7, 1880.

have felt themselves bound to follow the precedent of their predecessors, so that no new subjects were introduced. One would suppose from an examination of the papers set that those of the last five days must have been framed in accordance with a schedule as precise and detailed as that which governed the first three.

In 1865 the Board recommended that after 1866 Laplace's coefficients and the figure of the earth considered as heterogeneous should be included in the examination, but this appears to be the only extension of the range of subjects recommended by the Board during the time that the regulations of 1848 remained in force.

The period that followed the constitution of the Mathematical Board was one of activity in the whole University. The first examinations of the Moral Sciences Tripos and of the Natural Sciences Tripos were held in 1851. In 1850 a Royal Commission was issued to inquire into the University and Colleges, and in 1852 their Report was presented to Parliament. In consequence of this Report, a Bill was introduced into Parliament, which received the Royal assent in 1856; and, under its powers new statutes were framed, both for the University and the Colleges. Amid all these changes the Mathematical Board, though not very active, was not idle. The subjects which chiefly occupied its attention were the alteration of the date of the first three days from January to the previous June (as by recent changes the poll-men were examined in June, and so received their degrees seven months before the mathematical honour men), and the introduction of the *vivâ voce* element into the examination. Neither of these innovations, though frequently discussed and finally recommended by the Board, was received with much favour in the University. With regard to the latter, the opinion seems now to have become general that an admixture of the *vivâ voce* element, however valuable it may be in the lecture-room, is useless, or even worse, in testing the proficiency of candidates with the view to arranging them in strict order of merit. The change of time from January to June was at length effected, as will be seen, by the regulations which came into operation in 1882.

In 1866 the attention of the Board was directed to the exclusion of certain important branches of mathematics from the studies of the University, owing to the fact that they were not represented in the Tripos examination. The rewards attending a high place in the Tripos were so great that the reading of most of the best men was directed almost wholly to this end; it was therefore practically impossible to introduce new mathematical subjects into the University without assigning to them some place in the Tripos. Now, although the recommendations of 1849–50 had curtailed the range of subjects, the course had nevertheless extended itself in some directions—where the name of the subject permitted of such extension—and especially in analytical geometry and higher algebra. The fact of this extension taking place in certain subjects, while others were wholly omitted, alone sufficed to show the need of some revision of the limitations imposed upon the subjects that might be set. The Board, after careful consideration, came to the conclusion that the time had come when it was desirable to allow the candidates a certain option with respect to the higher branches of mathematics, and that this could be effected by increasing the number of subjects and arranging them in several divisions over which the marks were distributed in a known proportion. Each candidate would be at liberty to devote himself to such of the divisions as he thought most advantageous, there being nothing to prevent his taking up all the divisions, if it were possible for him to do so. In a Report dated May 8, 1867, the Board gave expression to these views, and recommended a scheme for the five days, according to which the subjects of examination were arranged in five divisions, with an approximately determinate number of marks assigned to each division. The subjects included in the five divisions were thirty-five in number, and included elliptic integrals, elastic solids, heat, electricity, and magnetism. On June 3, 1867, a syndicate was appointed by the Senate to consider the proposals of the Board; and the regulations recommended by this syndicate were approved by the Senate on June 2, 1868, and came into operation in January 1873.

In this new scheme of examination the three days were left unchanged, and the schedule of subjects for the five days, and their arrangement in divisions as proposed by the Board, were adopted with very slight modifications, the marks awarded to the five divisions being to those awarded to the three days in the proportion of 2, 1, 1, 1, $\frac{2}{3}$ to 1 respectively.[1]

The new regulations also made two other changes of importance: they added an extra day to the examination and increased the number of the examiners from four to five. The extra day was the day immediately following the three days, and it was devoted to easy questions upon the subjects in the five days' schedule. Although the papers set on this fourth day were put before all the candidates, they were taken into account along with the five-day papers, and not with the three-day papers; so that this day had no effect upon the alphabetical list of those who deserved mathematical honours; which, as before, was dependent upon the three days' marks only.

The Additional Examiner was appointed on the nomination of the Mathematical Board, and held office for one year only; and, to render his duties as little irksome as possible, he was not required to take part in the first three days—the most laborious part of the examination as far as the looking over the papers is concerned, on account of the quantity of work sent in. It was thought that in introducing the new subjects of electricity and magnetism into the examination, certain non-resident Cambridge mathematicians whose names were closely connected with great recent advances in these subjects might be willing to give the University the benefit of their assistance, and that the influence of eminent non-resident mathematicians upon the examination, and therefore also upon the course of studies in the University, would be of the greatest value. These hopes were abundantly justified.

The general working of the new system soon disclosed the fact that the desired effect of inducing the best candidates to make a selection from the higher subjects, and concentrate their reading, had not been attained. It was found that, unless the questions were made extremely difficult, more marks could be obtained by reading superficially all the subjects in the five divisions than by attaining real proficiency in a few of the higher ones; and the best men of the year were tempted, not to say compelled, to extend their reading as widely as possible over the book-work of the whole range of subjects. Thus, with respect to the main object which the framers of the scheme had in view, it was a complete failure.

Accordingly, on May 17, 1877, a syndicate was appointed by the Senate to consider the higher mathematical studies and examinations of the University. This syndicate consisted of eighteen members representing nearly all phases of mathematical research and study in Cambridge; they met every week during the whole academical year, and the thorough examination and discussion that the subject received, both on the syndicate and in the University at large, brought out in the strongest light how great were the intrinsic difficulties connected with the retention of the order of merit, and how wide was the diversity of opinion—so much so, that at one time it seemed almost hopeless to attempt to devise a scheme

[1] The regulation assigning the proportion of marks to be awarded to the different divisions was one which was found in practice very difficult to carry out, even approximately.

that should receive a fair amount of general support. Even when the subjects were restricted, as they had been in the twenty-five years from 1848–72, it was sufficiently difficult to include in one list all the various classes of candidates—those who may be described as professed mathematicians, who intended to devote themselves to mathematics after their degree as investigators or teachers; those who adopted mathematics as their subject of study on account of its unrivalled mental training, and subordinated their whole reading to the single object of obtaining the highest place their abilities would enable them to reach; and those who, without any hope of obtaining a good place in the list, desired, nevertheless, to graduate in the Tripos, on account of the high position held by mathematics among the branches of a liberal education. But, when the range of subjects was extended, there was the further dilemma: if there was to be a single order of merit, all the questions must be submitted to all the candidates; but, if a candidate was to be at liberty to attempt all the questions, it appeared that, under any scheme that could be devised, the best candidates would find it more to their advantage to read the elementary portions of all the higher subjects than the higher portions of a few. If the questions were to be alternative, how could the order of merit be retained? How was it possible to compare one student's elliptic functions with another's elastic solids? was a question often asked.

It was keenly felt in the University that subjects like heat, electricity, and magnetism could not with propriety be omitted from the course systematically studied by candidates for mathematical honours. On the other hand, it was universally admitted that, by the extension of the range of subjects, the severe strain of the competition had been intensified to an injurious extent; and not only had the addition of the new subjects aggravated the evils arising from excessive competition, but they had even caused a deterioration in the quality of the work of many of the students, who were led, in the hope of gaining higher places, to attempt matter really beyond their grasp. The opinion was expressed on the syndicate that the only escape from the dilemma was by abandoning the order of merit. The majority, however, preferred to attempt some other remedy without interfering with the final form of the Tripos list, which had been of such immense service to the University in the past, and was connected with so many valued associations. They therefore proposed, as the only method by which the pressure on the mathematical candidates could be relieved, to omit a varying portion of the higher subjects of examination in each year.

The Report of the syndicate was presented to the Senate on March 29, 1878. They recommended that the nine days of the examinations should be divided into three groups of three days each, called Parts I., II., and III. Part I. was to be the same as the first three days in the schemes that came into operation in 1848 and 1873. Part II. was to be conducted according to a schedule of subjects considerably more restricted than the unwritten schedule that ruled the five days from 1848 to 1872. It included the more elementary portions of most of the ordinary subjects, such as differential equations, hydrostatics, rigid dynamics, optics, spherical astronomy, &c, but excluded calculus of variations, thermodynamics, physical optics, &c. It was proposed to move forward the time of examination in these first two parts, from January to the previous June, *i.e.* two years and nine months from the time of coming into residence of the students. After the examination in Parts I. and II. a list of the candidates was to be published, arranged in three classes as before, the senior and junior optimes being placed in order of merit, and the wranglers in alphabetical order. Only the wranglers were to be admitted to Part III., which was to take place at the old time in the following January. A final list was then to be issued in which the wranglers were to be placed in order of merit, the marks obtained by them in all three parts being added together. The most important part of the scheme was the schedule of subjects for Part III. It contained all the subjects which were included in the schedule of the five days of the then existing examination (for the syndicate had decided that they would neither propose the addition of any new subjects nor the omission of any that had been already included), divided into three groups, A, B, C. It was recommended that questions from the subjects in group A should be set every year, and that questions from groups B and C should be set in alternate years. It was thus proposed to establish, as it were, a "rotation of subjects." This scheme was voted upon by the Senate on May 13, 1878, when all its essential features were rejected. The division of the examination into three parts, of which the first two should take place in June and the third in the following January, was agreed to, as also was the limitation of Part III. to wranglers; but the carrying over the marks of the wranglers from June to January and the proposed rotation of subjects were rejected.

It is evident that the acceptance of the scheme, even by those who assented to its principle, depended largely upon the manner in which the subjects were divided into the three groups A, B, C. Whether a satisfactory division of the subjects was possible is very doubtful; but it is certain that the grouping of the subjects proposed by the syndicate was extremely unsatisfactory.

This scheme, though it never came into operation, will be memorable in the history of the Tripos as the final attempt made to retain the order of merit in its old form. With its rejection there passed away all hope of expressing the results of the whole examination by means of a single order of merit. The scheme also deserves notice for its own sake, if only on account of the influential mathematicians who supported it.

The syndicate then proceeded to build a new scheme upon the ruins of the old. They considered that the result of the voting on the nineteen graces in which the previous scheme had been submitted to the Senate showed that it was the opinion of the University that the examination in Part III. should be independent of the preceding parts, and that no scheme would be acceptable in which it was not provided that all the subjects should be included in the examinations of each year. They accordingly presented a Report to the Senate in October 1878, in which they proposed that in June, immediately after the examination in Parts I. and II., the complete list of wranglers, senior optimes, and junior optimes should be issued arranged in order of merit, that Part III. should be a separate examination, to which wranglers only should be admissible, and that after the examination in Part III. a list should be issued in which the candidates were arranged in three classes, the names in each class being arranged in alphabetical order.

The schedule of subjects consisted of all the existing subjects divided into four groups, A, B, C, D. Group A contained the pure mathematics; Group B, the astronomical subjects; Group C, hydrodynamics, sound, physical optics, elastic solids, &c.; and Group D, heat, electricity, and magnetism. In order to encourage the candidates to specialise their reading, one of the regulations authorised the Moderators and Examiners to place in the first division a candidate who showed eminent proficiency in any one group; so that it was not absolutely essential for a student, in order to be placed in the first division, to extend his reading beyond the subjects of a single group.

This scheme was approved by the Senate on November 21, 1878, and it came into operation in 1882, the first examination in Part III. taking place in 1883.

Parts I. and II. taken together differed in no essential respects from the Tripos as it had existed from 1848. The five days of the scheme of 1848 were reduced to three, and the range of subjects was more limited; otherwise the examination was exactly the same as in the period 1848–72. But Part III. was a complete novelty, and a great deal of curiosity was felt as to how the first Moderators and Examiners would interpret the regulations. Would the new examination resemble, as regards the character of the questions set, the last three days of the old five days, or was the examination to be one of a distinctly higher order? The result showed that the latter anticipation was the correct one. No longer hampered by the order of merit, the examiners felt themselves free to set difficult and elaborate questions, such as were only appropriate to specialists in the particular subjects; and a new departure was made.

As soon as the new system came into full operation, it was found that it needed amendment in various respects; and this is not to be wondered at, considering that it had been constructed in order to fit in with the few regulations that had escaped the general massacre of May 1878, and that almost every part of it was the result of a compromise. It was found that the interval between June and January —less than seven months, and including a long vacation in which very few lectures were given—was too short for an adequate preparation for Part III. It is true that most of the work for Part III. could be done—and indeed was done—before the examination in Parts I. and II.; but the competition in these two parts remained as keen as ever, and, as the examination became imminent, the candidates were tempted to neglect the higher work, and give their whole attention to the more elementary subjects, upon which the list in order of merit depended. As a consequence there was a diminution in the numbers of students attending the higher mathematical lectures in the University. With respect to the actual conduct of the examination, it was found that the strain upon the Moderators and Examiners was very serious, and general regret was expressed that under the new scheme no provision had been made for the annual appointment of an Additional Examiner, as in the previous scheme which had been in operation from 1873 to 1882. Under the new system the candidates devoted themselves to special branches of the higher mathematics, and there was even greater difficulty in adequately representing all the subjects of examination. Accordingly, on June 12, 1884, the Senate confirmed a Report of the Mathematical Board recommending that the examination in Part III. should take place in June, exactly a year after that in Parts I. and II., and that the Moderators and Examiners, with the Chairman of the Mathematical Board, should nominate an Additional Examiner, the first nomination being made in the Easter term, 1885, and having reference to the examination in January 1886. It was considered that the Moderators and Examiners were themselves the best judges of the branches of mathematics in which they most desired assistance, and were therefore the most suitable body to nominate the Additional Examiner.

The last time that the whole examination took place in January was in 1882. This year (1886) the examination in Part III. has taken place in January for the last time, so that the historic connection between the Tripos and the month of January has now finally ended. Henceforth the examination in all three parts will take place in the middle of the year.

(*To be continued.*)

EARTHQUAKE AT SEA

We have received the following communication from Mr. R. H. Scott, F.R.S., Secretary, Meteorological Office:—

British Consulate, St. John's, Porto Rico, November 4, 1886

Sir,—I have the honour to inform you that Mr. J. Simmons, master of the British brigantine *Wilhelmina*, of Lunenburg, now loading in this port, has reported to me that, on October 20 last, at 4.30 p.m., while in latitude 19° 21′ N., and longitude 64° 22′ W., he felt a shock of earthquake which caused the ship to tremble. The shock lasted one minute, and was accompanied by a loud rumbling noise like distant thunder. Capt. Simmons states further that, were it not that he believed the depth of water at the spot to be no less than two thousand fathoms, he could have imagined that his vessel was running upon the rocks, so great was the vibration and so loud the noise. I have thought it my duty to report this occurrence officially, as it seems not improbable that some volcanic disturbance is in operation in the locality herein referred to.

I have the honour to be, Sir, your most obedient humble servant,

Reginald H. Hertslet,
H.M. Consul

The Assistant Secretary, Marine Department,
Board of Trade

NOTES

We regret to hear of the death at Calcutta of Father Scortechini from dysentery. He has succumbed to his extraordinary exertions in the botanical exploration of Perak, where he had made very large and valuable collections. These he intended to make the basis of a flora of this native State in collaboration with Dr. King, the Superintendent of the Royal Botanic Garden, Calcutta. His collections will, as far as possible, be made use of by Sir Joseph Hooker in the portions of the flora of British India now in progress at Kew.

One of the severest storms of recent years swept over the country in the middle of last week, being indeed a storm seldom paralleled for its wide-spread destructiveness. The damage to property and the loss of life have been exceptionally great, and each morning newspaper has been adding to the long tale of losses and disasters. Another peculiarity of the storm is that it was heralded with only the slightest premonitions of its approach. It was at Valencia only that the observations of the previous evening indicated a storm, and these even seemed to foreshadow no more than a subsidiary cyclone. But on Wednesday morning last week the centre of the storm had already advanced on the northwest of Ireland, where at Belmullet, at 8 a.m., the barometer had fallen, at 32° and sea-level, to 27·580 inches. In the course of the day the cyclone moved eastward at the rather slow rate of 20 miles an hour, and by 6 p.m. its centre was near Barrow-in-Furness, where the barometer is stated to have fallen to 27·410 inches. The centre passed somewhat to the south of Edinburgh, about half-past seven, pressure being then 27·650 inches, and the wind easterly. The greatest interest is attached to the observations that may have been made in the north of England and the south of Scotland during the evening of Wednesday week, from which the path of the cyclone may be traced; and particularly, if the low reading at Barrow-in-Furness be confirmed, what lower readings of the barometer were made to the eastward. But in any case it is plain that in this part of Great Britain, on the evening of Wednesday week, pressure fell nearly as low as it did on January 26, 1884, at Ochtertyre, Perthshire, where it fell to 27·333 inches; and it is remarkable that these two low barometers, hitherto the lowest observed by man anywhere on the land surfaces of the globe after being reduced to sea-level, have occurred in the British Islands, and within three years of each other. It is noteworthy that the lowest pressure on Ben Nevis was 23·451 inches at 2h. 31m. p.m., and that at the height of the storm, at 6 p.m., the wind was south-east, and blowing at the rate of fully 120 miles an hour—thus indicating that the storm was not only wide-spread, but that it also, as regards direction and force