

(iv) Fig. 1 shows that two blocks were subjected to a common tilting during the earlier stage but moved separately during the later.

At the time of the earthquake, two remarkable faults were renewed along old lines of dislocation. They are represented by the thick lines in Fig. 2. The Gomura fault, or series of faults, is 11 miles long, and runs in the direction S. 30° E. along the western boundary of the Oku-Tango peninsula. Relatively to the other side, the crust to the west of the fault was shifted as much as 8 ft. 2 in. to the south and uplifted about 1 ft. 8 in. The Yamada fault is about 4½ miles long, and runs in the direction N. 55° E. along the southern boundary of the peninsula. The crust on the north side of the fault was raised by as much as 2 ft. 3½ in. with respect to that on the other, and shifted 2 ft. 7½ in. to the east.

The main line of levels crosses both faults. The vertical displacements of the bench-marks between 1888 and the first series of levels after the earthquake show that the ground to the west of the Gomura fault has been generally tilted westwards, while the block bounded by the two faults has been tilted to the north by as much as 20". Similar curves have been drawn for each of the three intervals between successive series of levellings, and it is worthy of notice that, while the curve for each

interval differs materially from that up to the first series, the curve representing the total displacements between the first and fourth series resembles it very closely.

No less interesting are the results of the repeated triangulations of the district. Assuming that two points some distance to the south have remained stationary, the displacements of the various points after the fourth triangulation are represented in Fig. 2. From this, it is seen that the mass of the Oku-Tango peninsula has been displaced as a whole, with but slight deformation in itself, in a nearly north-west direction. Maps for the intermediate periods are also given, but they show no tendency to uniformity of displacement like that during the longer interval. One of the most striking features of the map is the discontinuity in the horizontal shifts along the Gomura fault. The greatest displacement measured (of 5 ft. 4½ in.) occurred at Asago, close to the Gomura fault. At two points, Simooka and Yosizawa, one on either side of the fault, displacements of 4 ft. 1 in. and 3 ft. 7 in. occurred in opposite directions nearly parallel to one another and to the fault. The sum of these amounts (7 ft. 8 in.) does not differ much from the total shift of 8 ft. 2 in. observed in a neighbouring portion of the fault. C. DAVISON.

Obituary.

PROF. PAUL APPELL.

OF the three eminent mathematicians who dominated French science at the beginning of this century, Paul Appell, who died on Oct. 23, aged seventy-five years, will pass down to posterity as an analyst of genius, whose personal charm was equal to the excellence of his teaching. Together with Henri Poincaré, whose mathematical achievements have still to find their equal, and Emile Picard, whom destiny has now left alone to represent the glory of his generation, Paul Appell has laid the foundations upon which a succession of research students and mathematicians have built. Indeed, his masterly "Traité de Mécanique Rationnelle" (1893-1896) maintains its position as a standard text, side by side with the "Traité d'Analyse" of Picard, and the "Méthodes Nouvelles de la Mécanique Céleste" of Poincaré.

Many of our own text-books on pure and applied mathematics still use Appell's lucid demonstrations of difficult problems, such as, for example, the finding of the area of a closed surface, or of the area swept by a moving line, on which is based the theory of the planimeter. But Appell went further than that in his wonderful work: guided by a remarkable intuition, he developed in unusual directions some of the subtlest parts of mechanics, although no experiments of that time could be quoted in support of his views. So he prepared the way for Einstein, whose theories he confirmed later in a supplementary volume on mechanics which he wrote in collaboration with his former pupil, Prof. Thiry.

The fundamental ideas of Paul Appell on higher analysis, which are scattered in a large number of

monographs and contributions to learned publications, can be found in his "Théorie des Fonctions Algébriques et de leurs Intégrales" (1895), written in collaboration with Prof. Goursat, and in his "Principes de la Théorie des Fonctions Elliptiques" (1897), written in collaboration with Dr. Lacour. Functions of an analytic point, series and definite integrals, periodic functions and functions of several variables, differential equations and their invariants, equations with partial derivatives, and the theory of potentials, are among the abstruse questions which he attacked successfully; and one should not forget his brilliant memoir on higher analysis, with which he secured the second prize in the international mathematical competition organised in 1889 by the King of Sweden, when Poincaré carried the honours of the day.

It is, however, with his thesis on pure geometry that Appell began his mathematical career in 1876, when he generalised the notion of involution discovered by Chasles, and made some remarkable applications of it in the theory of cubics. He was then awarded the degree of Doctor of Science and became lecturer in mathematics at the University of Dijon. In 1881 Appell was appointed to the chair of applied mathematics at the École Normale Supérieure in Paris, and in 1885 he was awarded the *Prix Bordin* for his memoir on the solution of a special problem first suggested by Monge.

In 1892 Appell was elected to the Paris Academy of Sciences, and in 1903 he became Dean of the Faculty of Science, and, soon after, a member of the Higher Education Council, in which capacity he exercised a far-reaching influence over the whole field of university education in France. In 1920 he

was appointed Rector of the University of Paris, whence he retired some years after on account of ill-health. On several occasions Paul Appell received the highest distinctions from French and foreign universities; and in 1924 Oxford conferred on him the honorary degree of Doctor of Science.

As a teacher, Paul Appell knew how to win the affection of his students by his patience, his kindness, his readiness to discuss difficulties, and his extraordinary ability in finding illuminating explanations for the most complicated questions he had to deal with. Those who were privileged to know him more intimately were not long in discovering his high moral virtues and also the secret sorrow of his heart. For Paul Appell was born in Strasbourg in 1855; and as a result of the Treaty of Frankfurt, sixteen years later, he was prompted to abandon his "petite patrie" for the sake of his "grande patrie, la France", to the restoration of which he was determined to devote his strength and energy. He tells his poignant story in his charming book, "Souvenirs d'un Alsacien", which makes his biographers' task an easy and pleasant one, and shows in all their simplicity and greatness his patriotic feelings. But more qualified pens will one day describe what his country and science owe to Paul Appell. These few inadequate notes are only meant as a respectful homage to the memory of a great man who was revered and admired by all who knew him.

THOMAS GREENWOOD.

PROF. J. H. TEACHER.

By the premature death on Nov. 21, at the age of sixty-one years, of Prof. John Hammond Teacher, the School of Medicine of Glasgow has lost a valuable member of its personnel. Educated at the Glasgow Academy and the University of Glasgow, he graduated in arts in 1888 and in medicine with 'High Commendation' in 1893. He took the higher degree ten years later and was awarded honours and a gold medal for his thesis.

It is probably true to say that of his teachers Dr. Joseph Coats was the most influential in determining Dr. Teacher's bent. From the first his interests centred in the problems of pathology. After serving as house surgeon and for a time as medical officer of the Rio Tinto Company in Spain, where he had the opportunity of observing the life-history of the malaria organism, he returned to undertake an important duty for his University. The celebrated Anatomical and Pathological Collection of William Hunter had long stood in need of reconditioning and rearranging. Dr. Teacher was appointed to do this, and after some years of work, produced a valuable two-volume catalogue of the collection, with descriptions and annotations which testify to the care and insight with which he had carried through the work. The volumes are prefaced by an interesting and scholarly introduction on William Hunter and his school in relation to the collection.

Dr. Teacher next spent some years as assistant
No. 3189, VOL. 126]

to the professor of physiology, being chiefly engaged in the histological work. Here he was able to perfect his microscopic technique, which was of a high order. About this time he entered upon a study of the remarkable disease known as chorionepithelioma, and to further this he travelled abroad to make acquaintance with all the early human embryos then known. Presented as a thesis, this memoir received recognition from his University, and was acknowledged an important contribution to the subject. In 1904 he joined the staff of Prof. Muir, and in view of his special proficiency and interest in microscopic work he was nominated by him for the lectureship in pathological histology. In 1909 he was appointed pathologist to Glasgow Royal Infirmary, and this appointment was followed in 1911 by his election to the St. Mungo (Notman) chair of pathology instituted in 1910. As St. Mungo professor he was *ex-officio* pathologist to the Royal Infirmary, and his professorship was inaugurated by the opening of the excellent new Pathological Institute, for the planning and organisation of which he was largely responsible.

Teacher's work on chorionepithelioma gave him a special interest in the history of the chorion in early development, and this was greatly enhanced by his discovery in 1907 of a very young embryo, the youngest hitherto known, in a minute piece of decidua sent to him for examination. The specimen was described in a memoir published in 1908 in conjunction with the writer of this notice. In 1923 he discovered another young embryo at an autopsy, and published in the *Journal of Obstetrics and Gynaecology of the British Empire* (1924) a very able and beautifully illustrated memoir on the history of the trophoblast and on the implantation of the blastocyst in the human subject. The contributions he made in these two memoirs to the problems connected with the earliest phases of human development have left his name permanently and honourably inscribed in the literature of the subject.

Apart from the reputation he won in this field, Teacher acquired merit for the able manner in which he conducted his routine duties as pathologist to the Royal Infirmary. To the literature of pathology he from time to time contributed papers (too many to be enumerated in this short notice), which were invariably characterised by accurate observation and careful presentation. His special interest, determined by the studies already referred to, was in gynaecological pathology, and he had accumulated a large amount of material for a book on the subject. It is a great misfortune that he was not granted time to carry this work to completion.

T. H. B.

CAPT. OTTO SVERDRUP.

OTTO SVERDRUP's name, like those of his fellow-countrymen, Nansen and Amundsen, ranks high in the story of polar exploration. In a long course of arctic voyages, he had become the most experienced ice-master of his time, and his knowledge was sought by many expeditions.

Sverdrup, who died in Norway on Nov. 26, was