

bined with equal precision, has probably never before been made.

Two theodolites were employed: An eighteen-inch by Troughton & Simms, and a ten-inch by Repsold. Dr. Gill reaches the following conclusions with regard to these two instruments:

1. That the employment of instruments larger and heavier than the Repsold ten-inch is attended with no advantage.

2. That observations should be made at each station equally in the morning and afternoon; if possible, also, in opposite directions of the wind.

3. That hardened steel pivots are essential.

4. That a watch telescope attached to the arms of the circle microscopes not only increases very materially the accuracy of the observations (even when the most rigid stand is employed), but it permits the use of a form of stand which is easy to erect and light and convenient for transport, without risk of diminished accuracy.

Many American geodesists will be surprised by conclusions 3 and 4.

Dr. Gill gives an interesting table of the probable error of a single angle, as obtained in various series of geodetic operations. Some of the values given are as follows:

	No. of Triangles.	Prob. Error.
South Africa, verification of Natal base,	5	$\pm .14$
South Africa, prolongation of Port Elizabeth base,	24	.23
U. S. Coast Survey, San Francisco and Salt Lake,	31	.25
U. S. Coast Survey, flat country,	198	.79
Ordnance Survey of Great Britain,	476	1.19

It is interesting to note that the poorest work was done on the Ordnance Survey of Great Britain, according to Dr. Gill's table.

In Colonel Morris's report we find the following interesting statement concerning transport:

"The equipment of the observing part of the detachment consisted of:

1. A military ambulance wagon, drawn by 16 oxen.

2. An 18-foot buck-wagon, drawn by 16 oxen.

3. A Scotch cart, drawn by six oxen.

4. A water cart, drawn sometimes by two oxen, sometimes by four.

5. The four out-parties were each provided with a Scotch cart drawn by six oxen.

The minimum number of oxen was therefore 66. A few additional animals were, however, always kept to supply the place of those which tired or fell sick, or which died from one cause or another."

We strongly recommend anyone interested in geodesy to procure a copy of Dr. Gill's interesting and important work.

THE *Astronomische Nachrichten* of September 8th contains an article by Dr. J. Repsold, in which he describes the newest micrometer devised by his firm. It is an instrument intended to combine the new form of transit micrometer, in which an effort was made to avoid the effects of personal equation, with a new kind of registering declination micrometer. Dr. Repsold points out that it is very desirable to increase the precision with which declination bisections can be made in the field of view, so as to bring the bisection to the same order of accuracy attainable in the reading of the circle microscopes.

H. J.

#### NOTES ON INORGANIC CHEMISTRY.

IN the current *Comptes Rendus* P. Villard describes a crystallized hydrate of argon with water. Argon is compressed to 150 atmospheres in the presence of water cooled to nearly zero. On chilling the tube at a small point crystallization begins proceeding out from the point cooled. Or crystallization may be induced by introducing a crystal of the hydrate previously formed. Crystallization does not take place, however, by merely compressing argon in the pres-

ence of cold water. The crystals are colorless and small, though easily visible with a lens. The tension of dissociation at  $0^{\circ}$  is about 105 atmospheres, at  $+8^{\circ}$  210 atmospheres.

AN account of the Jubilee of the Chemical Society of London, in 1891, has just been published by the Society in book form. It contains a record of the proceedings of the Jubilee meeting and also a full history of the Society. Abstracts are given of all the presidential annual reports, the subjects of all lectures before the Society, and the full text of the first Faraday Lecture, which was given in 1869 by Dumas, and which had never before been printed in the Society's publications. The whole volume, which includes 292 pages and gives the full history of one of the most important scientific societies of the world, will be found of value to all who are interested in chemistry.

A SERIES of experiments has been carried out by Messrs. Dixon and Baker, having for their object the determination of the chemical activity of the Röntgen rays. Carbon monoxid and oxygen (dry and moist), hydrogen and oxygen, carbon monoxid and chlorin, hydrogen and chlorin, and dry hydrogen and sulfid and sulfur dioxide, were exposed half an hour to the rays; sparks were passed through dry carbon monoxid and oxygen, both with rays falling on the mixture and when they were not. In no case could any chemical effect of the rays be detected, hence the authors conclude that if there is any chemical activity of the rays it is too small to be measured. The action of the rays on the photographic plate they attribute to the fluorescence of the glass behind the film.

J. L. H.

#### SCIENTIFIC NOTES AND NEWS.

THE attendance at the Liverpool Meeting of the British Association was 3,181, distributed as follows: Old life members, 330; new life

members, 31; old annual members, 383; new annual members, 139; associates, 1,384; ladies, 873; foreign members, 41. As had been already arranged, the meeting for next year will be at Toronto under the Presidency of Sir John Evans, beginning August 18th. The meeting in 1898 will be at Bristol and in 1899 at Dover. The sum of £1,355 was appropriated in grants for scientific purposes.

IN addition to the lecturers in connection with the sesquicentennial celebration at Princeton, already announced, the exercises will be attended by a number of distinguished men of science as delegates from foreign universities. The names have not as yet been published, but include M. Henri Moissan, the eminent chemist from the University at Paris, and Prof. E. B. Poulton, professor of zoology at Oxford, and personally known to many Americans from his previous visit.

WE learn from *Die Natur* that elaborate arrangements are being made in Portugal to celebrate the 400th anniversary of Vasco da Gama's discovery of the sea route to India. The 8th, 9th and 10th of July of next year are to be made national holidays and a number of expositions and congresses are to be held at Lisbon, including agriculture, ethnography, fisheries and hydrography. The event will also be celebrated by the Geographical Society of Vienna, before which an address will be made by Prof. Wilh. Tomaschek.

THE Jubilee of the discovery of anæsthesia will be celebrated in France in connection with the meeting of the French Surgical Congress beginning October 18th. The event will also be celebrated in London and in Boston. The first surgical operation under ether was carried out by Dr. J. Collins Warren in the Massachusetts General Hospital on October 16, 1846. The anæsthetic was administered by W. T. G. Morton, who about two weeks before had extracted a tooth from a patient under the influence of ether.

It is stated that Lieut. Joseph E. Maxfield, Chief Signal Officer of the Department of the Missouri, and now stationed in Chicago, will soon make an ascent on a man-carrying kite, to be built by Octave Chanute. The ascent will