specimens for local museums, and in concentrating the scientific activity of a district to the advantage of the local technical college, and of the district in general, Messrs. Sach and Ross, the resident science masters at Goulburn and Bathurst respectively, have formed scientific societies in their respective cities. These societies have already a good number of members, who meet regularly for the discussion of scientific questions, and they seem to Mr. Maiden to give promise of much usefulness.

AT the meeting of the Linnean Society of New South Wales on March 30, Mr. R. Etheridge, Jun., read a paper on, and exhibited, a very peculiar form of "womerah." It is from an unknown locality, but its history is partially known, and a clue is furnished by three very similar weapons in the Macleay Collection from Port Darwin. It is lath-like in form, slightly curved in outline, and altogether a remarkable implement, very unlike anything, to the author's knowledge, previously described.

DR. G. T. STEVENS publishes in *Science* of May 6 an interesting preliminary note on the relations of the motor muscles of the eyes to certain facial expressions. He has for some years closely observed the anomalies of the muscles which govern the movements of the eyes, and has been struck by the fact that remarkable changes often follow the modification of the conditions of these muscles. This led him not only to regard such facial changes with greater care, but to bring to the subject the aid of photography, by means of which alone the expressions could be accurately registered. Photographic portraits giving a direct front view of more than two thousand persons have thus been made. In each case a record, as full as he has been able to obtain, of the state of the eye muscles has been made, and in the majority of cases careful observations have been repeated many times during some weeks or months. Photographs have been taken at various stages of modification of these muscles, so that a comparative study of the face under varying conditions of the eye muscles has been rendered possible. The result of the investigation has been to demonstrate that "certain well-defined types of facial expression are not only associated with, but are dependent upon, certain relative tensions of the oculo-motor muscles." The object of his paper is to present the general characteristics of some of the most typical forms of expression which have their origin in efforts to adjust the eyes.

THE first part of a paper on the development of American armour-plate, by Mr. F. Lynwood Garrison, appears in the May number of the Journal of the Franklin Institute. It was the author's original intention to present in the form of a report the results of the recent armour-plate trials at Indian Head. As, however, these trials have been described in an excellent report by the Chief of the Bureau of Ordance of the U.S. Navy, Mr. Garrison has preferred to give a sketch of the development of armour-plate, combining with this the more important details of the official report. He writes from the standpoint of the metallurgist rather than that of the military engineer. At present great interest is centred upon the use of the complex steel alloys and the methods adopted to harden them, and it is to these subjects more particularly that he calls attention. The detailed methods of producing such alloys as well as the several methods for quenching and tempering armour-plate are kept secret by steel manufacturers; but the results are made public at the trials, and "the possible deductions to be made therefrom," says Mr. Garrison, "are patent to every observing and thinking engineer." The fact that he has had exceptionally good opportunities of making such observations is a sufficient reason for the publication of his views.

SOME interesting details as to the production of mercury in Russia have been submitted by Prof. Emile Muller, of Taschkent, to the Paris Geographical Society. A bed of this rare metal, discovered at Ekaterinoslav, is now worked with great energy, and 20,000 pouds (320,000 kilogrammes) of pure mercury are obtained. The entire demand for the metal in Russia is supplied from this source, and a surplus of 14,000 pouds (224,000 kilogrammes) is exported. During the past year mercury was discovered in the district of Daghestan, in the Caucasus, and it is expected that the discovery will lead to the growth of a profitable industry in that region.

THE vine industry in Bashahr, in the Punjab, was formerly of great importance; but of late years it has declined in consequence of the old trees having been attacked by a disease. Mr. Coldstream, the Deputy Commissioner of Simla, proposes to revive the industry, if possible, and has secured a large number of cuttings for the State.

THE *Pioneer Mail* (Allahabad) of May 5 says that locust swarms are reported from the frontier, and that stragglers have been observed again passing over Lahore. It is thought that they have chosen a bad time, as the district is full of the migratory hosts of starlings which come at this season of the year to feed upon wild mulberries, and few of the stragglers are likely to "run the gauntlet" successfully.

THE additions to the Zoological Society's Gardens during the past week include a Bonnet Monkey (*Macacus sinicus* ♀) from India, presented by Mr. M. McPherson; a Crested Porcupine (*Hystrix cristatus*) from Africa, presented by Mr. J. Bullock; a Common Pea-fowl (*Pavo cristatus*) from India, presented by Colonel Bagot Chester; two Yellow-bellied Toads (*Bombinator bombinus*), European, presented by Mr. A. M. Ansler; two Black Bears (*Ursus americanus*) from North America, deposited; a Japanese Deer (*Cervus sika* ♂); a Bennett's Wallaby (*Halmaturus bennetti* ♀); two Himalayan Monauls (*Lophophorus impeyanus*); two Greater Black-backed Gulls (*Larus marinus*), bred in the Gardens.

OUR ASTRONOMICAL COLUMN.

PARIS OBSERVATORY REPORT.—The annual report on the state of the Paris Observatory for the year 1891, presented by Admiral Mouchez, shows that a considerable amount of work, as in former years, has been accomplished during the past year. After mentioning briefly some of the last reports that have been communicated by those who are undertaking the work of photographically charting the heavens, he gives a *résumé* of the resolutions that have been adopted during the session of 1891. In the table showing the zones allotted to the different Observatories, that given to Greenwich lies between declinations + 90° and + 65°, and that to Oxford between + 31° and + 25°; the number of plates for each zone being 1149 and 1180 respectively. A *résumé* of the meridional observations for the year informs us that no less than 19,458 observations were made, while those of the planets amounted to 570. M. Paul Henry, M. Wolf, and M. Deslandres, have all been busily engaged in their respective sections, their work having been previously mentioned in these columns. The second volume of the catalogue and the second volume of the observed positions (6h. to 12h.) have been completed and published; while Part III. (12h. to 18h.) is still in preparation. The observations for 1884 are now quite finished, and those for 1885 will be ready by the end of this year. The verification of the reduction of the observations made in 1884-86 for the formation of a catalogue of twenty-four stars very near the Pole has already been commenced, and should, when completed, form a most important volume. The individual works that have been published from time to time are also referred to here. The meteorological observations and time service have been continued as usual.

STARS WITH REMARKABLE SPECTRA.—No. 3090 of the *Astronomische Nachrichten* contains a list of stars with remarkable spectra, continued from a former number (3023) of the same periodical, and communicated by T. E. Espin. The num-

ber of spectra described here is no less than 121, and the star places have all been brought up to the year 1900.

COMET 1892 SWIFT (MARCH 6).—The ephemeris of this comet for this week is as follows :—

1892.	R.A. h. m. s.	Decl. ° ′	log Δ.	log r.	Br.
May 27	23 43 17	+35 36·6			
28	45 36	36 2·2			
29	47 54	36 27·4	0·1727	0·1297	0·42
30	50 10	36 52·1			
31	52 24	37 16·2			
1	54 36	37 39·9			
2	56 46	38 3·2	0·1821	0·1429	0·38

The brightness at the time of discovery is taken as unity.

On the 30th the comet will lie in the prolongation of the line joining v and θ Andromedæ, being about twice the distance from θ as is σ.

LIGHT VARIATIONS OF Y CYGNI.—In *Astronomische Nachrichten*, No. 3091, Prof. Dunér discusses the results of his observations, made during the interval April 1891 to April 1892, of Y Cygni, with respect to the cause of the anomalies in the light variations. The number of minima observed amounted to twenty-seven, and on their reduction (together with many others), by grouping the differences between observation and calculation in a particular way, the values for the normal deviations were obtained. These figures showed that the even and odd epochs deviated on the positive and negative sides respectively; and from subsequent calculation, in which $\pm z$ represented constant deviation of the even from the odd minima, the numerical value of z was found not to be constant, but a slowly-increasing quantity. Mr. Yendell, who has previously considered this question, explained the possibility of representing such differences by a periodical function, but Prof. Dunér, assuming a systematic difference between the even and odd epochs, explains them otherwise—"that the star Y Cygni consists of two equally large and bright components, which revolve around their common centre of gravity in an elliptic orbit with a period of revolution of 2d. 23h. 54m. 44s.; the perihelion passages occurring between the even and the odd epochs." If the value of z be found to be real, and not as at present only suspected, we might suppose "a third body, dark or only slightly luminous, which should cause a perturbation in the position of the lines of apsides, such as we recognize in the planets and satellites of our solar system."

To facilitate observation, Prof. Dunér gives an ephemeris for the times of minima expressed in Greenwich mean time. From the latest observations these times may be probably half an hour too late.

Epoch.			Minimum.		d.	h.	m.
1341	...	...	1892	June	9	9	33
1361	...	...		July	9	8	40
1381	...	...		August	8	7	46
1401	...	...		September	7	6	52
1421	...	...		October	7	5	58
1441	...	...		November	6	5	5
1461	...	...		December	6	4	12

NEBULÆ.—The *Monthly Notices* for April contain some notes on observations of nebulæ made by Mr. Burnham with the 36-inch refractor of the Lick Observatory. The work was undertaken by him during the months of September and October, 1891, in order to give fuller details concerning the descriptions, places, and actual existence of several of these objects included in the general catalogue. All the places derived from the measures are referred to the epoch 1860 of the general catalogue, while the numbers used in all cases are those of Dreyer's general catalogue.

During this survey, several new nebulæ were found, although no attempt was made to search for new objects. The following list includes some of these, together with some of the doubtful nebulæ :—

No. 707.—R.A. 1h. 44m. 31s., Decl. −9° 12′·0. In the immediate vicinity of this a new nebula was found, R.A. 1h. 43m. 31s., Decl. −9° 13′·4.

No. 874.—R.A. 2h. 9m. 43s., Decl. −23° 50′·5. No nebula found near this place. Probably a faint star had been seen, as many are near this position.

No. 942.—R.A. 2h. 21m. 30s., Decl. −11° 27′·2. Near this position are three fainter nebulæ, two of which have been observed before, but one quite new. The places for these three are Neb. (*a*) (new) 2h. 22m. 0 5s., Decl. −11° 27′·9; Neb. (*b*) 2h. 22m. 23·5s., −11° 28′·1; and Neb. (*c*) 2h. 22m. 22·7s., −11° 27′·6.

No. 988.—R.A. 2h. 28m. 34s., Decl. −9° 57′·9. No suggestion of any nebulosity about this star after very careful scrutiny.

Barnard.—R.A. 5h. 14m. 33s., Decl. + 3° 20′·7. In sweeping for this double nebula, another nebula was found in the immediate vicinity, R.A. 5h. 14m. 40s., Decl. + 3° 10′·4.

No. 1988.—R.A. 5h. 29m. 4s., Decl. + 21° 7′·7. Not the least trace of nebulosity here. Dreyer stated that Tempel pointed out that supposed nebula was only a false image of the star. New observation endorses this view.

No. 7447.—R.A. 22h. 53m. 6s., Decl. −11° 16′·7. This object certainly does not exist.

No. 1086.—Near this nebula are two others—

Neb. I. 2h. 40m. 49s., Decl. + 40° 28′·5.
Neb. II. 2h. 41m. 12s., Decl. + 40° 28′·6.

ANNIVERSARY MEETING OF THE ROYAL GEOGRAPHICAL SOCIETY.

THE anniversary meeting of the Royal Geographical Society was held on Monday afternoon, when the Right Honourable Sir Mountstuart E. Grant Duff was re-elected President. The following changes have taken place amongst members of the Council :—Sir Henry Rawlinson and Mr. Clements R. Markham have been appointed Vice-Presidents in the room of Sir Frederick Goldsmid and Sir Beauchamp Walker, both of whom remain on the Council, Sir Beauchamp Walker being appointed Foreign Secretary in place of the late Lord Arthur Russell. In addition to the Councillors who have been elected Vice-Presidents, the following have retired by rotation :—Sir George Bowen, Dr. R. N. Cust, Sir Alfred Dent, the Duke of Fife, and General Maclagan. In their place Lieut.-Colonel J. C. Dalton, Sir Arthur Hodgson, Mr. John Murray (the publisher), Mr. E. G. Ravenstein, Sir Rawson Rawson, and Colonel Tanner have been elected.

During the meeting the Royal Medals for the Encouragement of Geographical Science and Discovery were presented, the Founder's Medal being given to Dr. Alfred Russel Wallace in recognition of the high geographical value of his great works, "The Geographical Distribution of Animals," "Island Life," and "The Malay Archipelago," and his further claim for distinction as co-discoverer with Darwin of the theory of natural selection. The Patron's Medal was presented to Mr. Edward Whymper for the results of his journey in 1879-80, recorded in his work, "Travels among the Great Andes of the Equator," London, 1892, 2 vols., besides a volume on the aneroid barometer. The Murchison Grant for 1892 went to Mr. Robert Swan, surveyor and geologist, who accompanied Mr. Bent in his expedition to Mashonaland, making a careful route-map of the country traversed down to the East Coast at Beira; the Back Grant to the Rev. James Sibree, for his many years' work on the geography and bibliography of Madagascar; the Cuthbert Peek Grant to Mr. Charles W. Campbell, for his important journeys in Korea; and the Gill Memorial to Mr. G. H. Garrett, for important geographical work done during the past fifteen years in Sierra Leone. Mr. Mackinder and Mr. Buchanan gave a short account of the Geographical Lectureships at Oxford and Cambridge. The scholarships and prizes given by the Royal Geographical Society to students in training colleges for 1892 were also presented.

The President delivered the annual address on the progress of geography, in the course of which, after referring to the evening meetings and to the Proceedings for the past year, he said :—

'With our meetings all Fellows of the Society who live in London, and with our Proceedings all Fellows of the Society, may be taken to be more or less familiar, but our Fellows by their contributions do a great deal more for their science than to make it possible to hold meetings and to publish Proceedings; nor does it seem unadvisable to remind them, from time to time, what they are doing in other ways for science and the body politic. They are aware that an annual vote of £500 is taken in the Estimates in aid of the Society's