secondary nucleus of the embryo-sac, or with one of its constituent polar nuclei, to form the endosperm. There is, therefore, in *Lilium martagon*, according to M. Guignard, a double process of conjugation; but the union of the "antherozoid" with the secondary nucleus of the embryo-sac he regards as a process of "pseudo-fecundation." Similar results have been obtained by Prof. S. Nawaschin, and they have been confirmed by Miss Ethel Sargant in a paper read before the Royal Society on May 4.

THE third part of the series of memoirs, in course of publication by the Cambridge University Press, on the material collected during Dr. Arthur Willey's expedition to the Pacific in search of the eggs of the Pearly Nautilus, has just been issued. Three papers are contained therein, dealing respectively with orthogenetic variation in the shells of Chelonia, by Dr. Hans Gadow; Enteropneusta from the South Pacific, by Dr. Willey; and a collection of Echiurids, by Mr. A. E. Shipley.

AN account of the communications and discussions at the International Congress of Zoologists, which met at Cambridge in August last, was given in NATURE at the time of the meeting (vol. lviii. p. 424). A fine volume of *Proceedings*, edited by Mr. Adam Sedgwick, F.R.S., has now been published by Messrs. C. J. Clay and Sons. The volume contains the papers and addresses read before the congress, with reports of remarks made upon the subjects of these communications, and also during the discussions of specific points of zoological importance. Fifteen coloured plates are appended to the volume to illustrate some of the papers. The nature of the contents can be judged from our summary of the work of the congress, and the editor is to be congratulated upon being able to see the *Proceedings* published nine months after the meeting. Few official reports of international congresses appear with such commendable promptitude.

A DIAZO-BODY is a substance obtained by the interaction of nitrous acid and an amine (such as aniline) under certain conditions of temperature. Perhaps no other reaction in organic chemistry is so important either theoretically or technically, and it is so fundamental that the term "to diazotise" has been coined to express the operation. Diazo-compounds are of the general type R.N=N.OH, where R may be any benzene group (C_6H_5, and so on), and are distinguished by their great instability and explosive power, tending to give off nitrogen. By very simple reactions the substance R.N=N.OH may be made to give R.OH, R.Cl, RBr, RI, RH, $R.NH_2$, R.NH.NH_2. In many questions of constitution of benzene ring compounds, the exchange of the diazo-group for the sulphonic group is a necessary step in the argument. The methods hitherto proposed for carrying out this reaction give, in general, very bad yields and involve the production of evil-smelling thio-compounds as intermediary products. In a recent number of the *Berichte*, Dr. Ludwig Gattermann describes a very elegant method, the discovery of which, he states, was due to a happy accident which depends upon the formation of a sulphinic acid directly from the diazo-compound. The diazo solution, preferably as sulphate, is mixed with an excess of sulphuric acid and saturated with sulphur dioxide, and then treated at 0° C. with finely-divided metallic copper, when the sulphinic acid is formed in practically theoretical quantity. The method has been found to be of wide applicability, equally good yields being obtained in the naphthalene series.

THE additions to the Zoological Society's Gardens during the past week include a Hoolock Gibbon (*Hylobates hoolock*, ♂) from Upper Burma, presented by Mr. S. B. Bates; two Blue-bearded Jays (*Cyanocorax cyanopogon*) from Brazil, presented by Mr. Arthur Ussher; a Laughing Kingfisher (*Dacelo gigantea*) from Australia, presented by the Hon. A. Littleton; two Black-bellied Sand-Grouse (*Pterocles arenarius*) from Asia, presented by Mr. G. P. Torrens; twelve Sharp-headed Lizards (*Lacerta dugesi*) from Madeira, presented by Mr. R. H. Archer; two Green Lizards (*Lacerta viridis*), a Tessellated Snake (*Tropidonotus tessellatus*), a Common Snake (*Tropidonotus natrix*), European, presented by the Rev. F. W. Haines; a Northern Mocking-Bird (*Mimus polyglottus*) from North America, presented by Mr. C. Gillett; a Greater Sulphur-crested Cockatoo (*Cacatua galerita*) from Australia, two Spiny-tailed Iguanas (*Ctenosura acanthura*) from Central America, deposited; two Derbian Screamers (*Chauna derbiana*) from Colombia, two Palm Squirrels (*Sciurus palmarum*) from India, a Diamond Python (*Python spilotes*) from Australia, purchased; two Burrhel Wild Sheep (*Ovis burrhel*, ♂ ♀), two Jameson's Gulls (*Larus novae-hollandiae*), bred in the Gardens.

OUR ASTRONOMICAL COLUMN.

TEMPEL'S COMET 1899 *c* (1873 II.)—M. L. Schulhof has calculated new elements and a continued ephemeris for this comet, using the positions supplied from the observations of Messrs. Perrine and Javelle, made at Lick and Nice respectively. *Astr. Nach.* (Bd. 149, No. 3574).

Elements.

T = 1899, September 6·0 Paris Mean Time.

M =	7° 21′ 50″·5	
π =	185 36 20·0	1899·0
Ω =	120 57 56·3	1899·0
i =	12 38 52·6	1899·0
φ =	32 49 38·7	
μ =	671″·9166	

Ephemeris for 12h. Paris Mean Time.

1899.	R.A.	Decl.	Br.
	h. m. s.	° ′ ″	
June 25 ...	20 8 16·8	... − 7 23 2	... 2·282
26 ...	9 36·7	... 7 40 5	
27 ...	10 56·1	... 7 57 54	
28 ...	12 15·0	... 8 16 30	
29 ...	20 13 33·4	... − 8 35 52	... 2·525

COMET 1899 *a* (SWIFT).—Dr. A. Stichtenoth, of Kiel, contributes a continued ephemeris of this comet to *Astr. Nach.* (Bd. 149, No. 3574).

Ephemeris for 12h. Berlin Mean Time.

1899.	R.A.	Decl.	Br.
	h. m. s.	° ′	
June 22 ...	14 38 41	...+27 37·1	... 0·27
23 ...	36 6	... 26 39·4	
24 ...	33 43	... 25 44·1	... 0·23
25 ...	31 34	... 24 51·3	
26 ...	29 34	... 24 0·8	
27 ...	27 44	... 23 12·6	
28 ...	26 3	... 22 26·4	... 0·17
29 ...	14 24 31	...+21 42·3	

During the week the comet travels almost in a direct line between the stars ε and α Bootis. It can only with difficulty be now detected with telescopes of less than three inches aperture.

SPECTRA OF RED STARS (CLASS III. *b*).—In August last, 1898, results of a photographic study of the stars of Secchi's Type IV. (Vogel's III. *b*), made by Mr. Ellerman and Prof. G. E. Hale at the Yerkes Observatory, were discussed at the Harvard Conference (*Astro-Physical Journal*, *vol. viii. p. 237, 1898*). The photographs were obtained with a spectrograph having only one prism and a long-focus camera (20·0 inches). Since that time the spectrograph has been remodelled and provided with a train of three prisms and a shorter focus camera (10·8 inches), and with this instrument much better photographs have been obtained with shorter exposures. *Bulletin* No. 7 of the Yerkes Observatory contains a short description of these, with a plate showing the spectra of four stars of this class (*Astrophysical*

Journal, vol. ix. p. 271, 1899). The examination of the photographs has resulted in the possibility of arranging ten of the stars in a series indicating progressive evolution, and the four given are sufficiently representative to show the changes indicated. These are—

I. 280 Schjellerup = DM 59°·2810 (Magn. 7·8).
II. 273 ,, = 19 Piscium (Magn. 5·5±).
III. 132 ,, = U Hydræ (Magn. 5·5±).
IV. 152 ,, = (Magn. 5·5).

The presence of *bright lines* formerly announced is confirmed by these photographs, and some of these are identical with those observed visually by Prof. Duner at Upsala. Any attempt to establish a connection between these stars and those of other types must include these bright lines, but as yet no star is known intermediate in character between these red stars and other groups. In the absence of a suitable instrument for detecting such bodies at the Yerkes Observatory, advantage has been taken of an offer from Prof. Pickering to photograph suspected objects with the objective prism, and in case this indicates a body of new constitution, the 40-inch refractor and stellar spectrograph will be employed for its detailed examination.

The photographs extend from λ 5150 to λ 5850, the carbon fluting with maximum about λ 563 being specially distinct in the spectra of 19 Piscium and U Hydrae.

Bulletin No. 9, in the same number of the *Journal*, p. 273, contains a plate illustrating a later attempt to find some position for these stars of Class III.*b* in the stellar constitutional system. The stars compared are—

I. The Sun (Type II.).
II. μ Geminorum (Type III.).
III. 132 Schjellerup (Type IV.).

In the region extending from b_4 to about λ 5300, the spectra of μ Geminorum (Type III.) and 132 Schjellerup (Type IV.) are almost identical, while in the region slightly less refrangible there are many common lines. Further towards the red the spectra become very dissimilar, the strong flutings of carbon seen in 132 Schjellerup being entirely wanting in μ Geminorum, although there are a few common features sufficient for comparison. Other photographs in the region Hβ to Hγ show similar coincidences. These photographs, it is stated, show a decided connection between the two classes of red stars, and the observation of more of them may bring out other links in their relationship.

REMINISCENCES OF DARWIN—SIR JOSEPH D. HOOKER.

A STATUE of Charles Darwin by Mr. Hope Pinker, presented to the University of Oxford by Prof. Poulton, Hope Professor of Zoology, was unveiled at the University Museum on the 14th inst., and Sir Joseph D. Hooker delivered the following address, which we reprint from the *Times*, upon the occasion :—

The Vice-Chancellor of your University has done me the honour of asking me to address you on the occasion of the installation of the statue of the great naturalist which now adorns your museum, and has expressed his opinion that a few personal reminiscences would be more acceptable to you from me than an *éloge* of Mr. Darwin's researches and discoveries, of which latter indeed an excellent reasoned *résumé* is well known to you as the work of your Hope professor of zoology. In accepting the task of giving personal reminiscences, I am reminded of the fact that narrators of an advanced age are not only proverbially oblivious, but are too often the victims of self-deception in respect of what they think they remember, to which must be added that where a dual personification is attempted the narrator is apt to assume the more prominent position. I have thus many snares to avoid, and must hope for a lenient judgment on what follows.

Early Friendship with Darwin.

The fact of our having commenced our scientific careers under very similar conditions favoured the rapid growth of a bond of friendship between Mr. Darwin and myself. We both of us, immediately after leaving our respective Universities, commenced active life as naturalists under the flag of the Royal Navy; he as a volunteer eight years before me, who was an official. We both sailed round the world, collecting and observing often in the same regions, many of them at that time seldom visited and since made accessible to science by his researches—the Cape Verde Islands, St. Helena, Rio, the Cape of Good Hope, the Falkland Islands, Tierra del Fuego, Tasmania, and New Zealand. On returning to England we both enjoyed the rare advantage of the counsel and encouragement of one of the greatest leaders in science of the time—Mr., afterwards Sir Charles, Lyell. It was through the father of Sir C. Lyell, the translator of the "Vita Nuova" of Dante, and a friend of my father, that I first heard of Mr. Darwin. The "Journal of Researches into the Natural History and Geology of the Countries visited during the Voyage of the *Beagle*" was then passing through the press, and the proof sheets were being submitted to Sir C. Lyell for his information and criticisms. These were passed on to Sir Charles's father, himself a naturalist, who was permitted to lend them to me for perusal, because I was then preparing to accompany Sir James Ross as a naturalist on the Antarctic expedition (1839-43). At that particular time I was engaged upon engrossing hospital duties, and I slept with the proofs under my pillow that I might at once, on awaking, devour their contents. They impressed me profoundly, I may say despairingly, with the genius of the writer, the variety of his acquirements, the keenness of his powers of observation, and the lucidity of his descriptions. To follow in his footsteps, at however great a distance, seemed to be a hopeless aspiration; nevertheless they quickened my enthusiasm in the desire to travel and observe. A copy of the complete work was a parting gift from Mr. Lyell on the eve of my leaving England, and no more instructive and inspiriting work occupied the bookshelf of my narrow quarters throughout the voyage. In the interval I had been introduced to Mr. Darwin, on a casual meeting in Trafalgar-square by a brother officer who had accompanied him in the *Beagle* to Rio, when I was impressed by his animated expression, heavy beetle brow, mellow voice, and delightfully frank and cordial greeting to his former shipmate. Shortly after the arrival in England of the Antarctic expedition (in 1843) I received from Mr. Darwin a long letter, warmly congratulating me on my return to my family and friends, directing my attention to the importance of correlating the flora of Fuegia with those of the Cordillera and of Europe, and inviting me to study and publish the botanical collections which he had made in the Galapagos Islands, Patagonia, and Fuegia.

Visits to Darwin at Down.

This led to an interchange of views on the subject of geographical distribution, followed by an invitation to visit him at what he used to call his inaccessible home at Down, which was then eight or ten miles distant from the nearest railroad station. This I joyfully accepted; and then commenced that friendship which ripened rapidly into feelings of esteem and reverence for his life, works, and character that were never clouded for one instant during the forty subsequent years of our joint lives. In the admirable biography of his father by my friend, Prof. Frank Darwin, are recorded the subjects, especially botanical and geographical, which were for many years the subjects of conversation and correspondence between us. During the many visits to Down which followed, he laid before me without reserve, not only his vast stores of knowledge, but his mature and immature speculations and theories, describing how they originated, and dwelling on their influence on the progress of his researches. Among these, so long ago as 1844, was his sketch of "The Origin of Species," which I was the first to see of the few friends to whom he ever showed it. At that very early period of my own studies I failed to grasp its full significance, *à propos* of which I may mention that I have been reproached for this by friends who have wondered, not only that I did not assimilate it at once, but that I did not apply it to my earliest essays on the distribution of plants. My friends overlooked the fact that the communication was a confidential one, of a hypothesis which its author hoped to establish as a tenable theory by an accumulation of facts in support of it, which he was engaged in collecting with a view to future publication. On the occasions of many other visits it was Mr. Darwin's practice to ask me, shortly after breakfast, to retire with him to his study for twenty minutes or so, when he brought out a long list of questions to put to me on the botanical subjects then engaging his attention. These questions were sometimes answered offhand, others required consideration, and others a protracted research in the Herbarium or in the gardens at Kew. The answers were written on slips of paper, which were deposited in bags or pockets that hung against the wall within