

TABLE A.—SPECIFIC DIFFERENCES IN GROUP II.

Species	Radiation flutings of carbon.					Absorption flutings.										Whether hydrogen lines.
	Hydro-carbon, 431.	Carbon B, 461.	474.	517.	564.	8.	7.	6.	5.	4.	3.	2.	1.			
1	Very narrow	Very narrow	Very wide and pale	Wide and pale	Wide and pale	If present mask dby517	Thin & dark	Ba.	Pb(r).	Mn(r).	Mn(ε).	Fe.	—	Yes		
2	Widens	Widens	"	"	"	"	"	"	"	"	"	Appears thin and pale	—	No		
3	Widens	Widens	Narrowing & brightening	Narrowing & brightening	"	Appears dark	Darkens	"	"	"	"	"	—	No		
4	Widens	Widens	"	"	Very narrow	Widens	Darkens	Unmasked dark	"	"	"	Darkens	—	No		
5	Widens	Widens	"	"	"	Still darker and wider	Widens	"	"	"	"	"	—	No		
6	Widens	Widens	Weaker	Brighter and narrower	"	"	Widens	"	"	"	"	Widens	—	No		
7	Widens	Widens	"	"	"	Narrows	Narrows	"	"	"	"	"	—	No		
8	Widens	Widens	"	"	"	"	"	"	"	"	"	"	—	No		
9	Widens	Widens	Fading	Fading	"	"	"	"	"	"	"	"	—	No		
10	Widens	Widens	"	"	"	Appears	"	"	"	"	"	"	—	No		
11	Widens	Widens	"	"	"	Narrows in all but the brightest stars	"	"	"	"	"	"	—	No		
12	Widens	Widens	"	"	"	Disappears	"	"	"	"	"	"	—	No		
13	Widens	Widens	"	"	"	"	"	"	"	"	"	"	—	No		
14	Widens	Widens	"	"	"	"	"	"	"	"	"	"	—	No		
15	Widens	Widens	"	"	"	"	"	"	"	"	"	"	—	No		

(To be continued.)

NOTE.—The lecturer here referred to tables showing the bodies of this group recorded in Dunér's Catalogue arranged in species, in accordance with the above scheme.

THE ROYAL SOCIETY CONVERSAZIONE.

THE first *conversazione* of the season was held on May 9, and was very numerously attended. More pains than ever seemed to have been bestowed on the arrangements, and the results entirely justified them. As the carefully prepared programme covers eighteen closely printed pages, we can only give a very summary account of the most important demonstrations and exhibits.

Following recent precedents, the meeting-room was devoted to demonstrations by means of the electric lantern, the following being given: image of electric spark, by Dr. Marcet; Mr. Poulton's teeth of *Ornithorhynchus*, by Dr. Hickson; Forth Bridge, by Mr. Baker; collieries, by Mr. Sopwith.

The chief exhibits in the other rooms were as follow:— Experiments on the optical demonstration of electrical stress, shown by Prof. A. W. Rücker, F.R.S., and Mr. C. V. Boys. These experiments are similar to those devised by Dr. Kerr, the arrangements being modified so as to render them suitable for exhibition in public. Conductors of various forms are immersed in bisulphide of carbon and placed between crossed Nicol prisms. When the conductors are oppositely electrified the medium is thrown into a state of stress, and the light which had been extinguished by the analyzing prism is restored. The various forms of conductors employed are—parallel cylinders, concentric cylinders, parallel planes, a plane and cylinder, and plates bent so as to represent a section of a Leyden jar. Many of the phenomena exhibited by crystals in plane polarized light are imitated—*e.g.* the black cross and the production of colours similar to those in Newton's rings. A bright field can be maintained by the introduction of a plate of selenite between the Nicols, in which case the electrical stress is indicated by change of colour.

Large electrical influence machine, exhibited by Mr. James Wimshurst. It has twelve disks of 2 feet 6 inches in diameter; each disk carries sixteen metal sectors. The machine is self-exciting in any condition of atmosphere. It shows large and perfect brush discharge at its terminals. With Leyden jars it will give sparks 13³/₈ inches in length.

Photographs of flashes of lightning, exhibited by the Royal Meteorological Society.

Radio-micrometer, exhibited by Mr. C. V. Boys. This is probably the most delicate instrument for measuring radiant heat yet made. It consists of a circuit made of antimony, bismuth, and copper hung by an exceedingly fine fibre of quartz in a strong magnetic field. A scale model of the circuit, twenty times the size or 8000 times the weight, shows the construction of the suspended part of the instrument. The fibre, if magnified to the same extent, would still be finer than spun glass. The proportions of the several parts are those which have been found by calculation (confirmed by experiment) to give the greatest possible delicacy.

Experiments with soap-bubbles, also shown by Mr. Boys. These experiments are arranged to show chiefly the power of an air-film to prevent two bubbles from coming into real contact. Thus, among other experiments, the outer of two bubbles may be pulled out until it squeezes the inner one into a long oval, but no real contact takes place. An inner bubble filled with gas will carry up an outer one to which are attached a wire ring and other things without really touching it at all. A bubble will roll down a spiral groove, also made of soap-film, or jump one or two steps at a time down a spiral staircase made of soap-film, without touching the spiral film or being injured in the least. Some of the experiments show the effects of diffusion, of vibration, of magnetism, or of electricity upon bubbles or groups of bubbles.

Maps and diagrams illustrative of the recent work of the Geological Survey in the North-West Highlands, exhibited by the Director-General of H.M. Geological

Survey. The maps, on the scale of 6 inches to a mile, show the remarkable geological structure of the west of Sutherland. A series of enormous dislocations runs in a southerly direction from the mouth of Loch Eriboll to Skye. By these disruptions the most ancient rocks have been torn up from great depths, and have been launched bodily westwards, sometimes for several miles. The displaced masses now rest upon other shifted portions or upon wholly undisturbed rocks, and the extraordinary structure is presented of vertical and highly inclined strata, with their unconformable junctions standing upon gently inclined and much younger rocks. The diagrams are taken across some of the more typical parts of the district, and give some idea of the physical problems presented by this region, which undoubtedly exhibits the most complicated geological structure in the British Isles.

Sections and specimens illustrating the recent borings in the Delta of the Nile, exhibited by Prof. J. W. Judd, F.R.S., on behalf of the Delta Committee. The whole of the samples obtained in these borings have now reached the Royal Society, and the examination of the materials reveals some facts of great geological interest. The alterations and mixtures of blown sand and Nile alluvium were found to continue down to the depth of 121 feet from the surface and 95 feet below the level of the Mediterranean. At that depth a remarkable change in the deposits took place, and beds of gravel containing both pebbles and subangular fragments of quartzite, chert, compact limestone, with some metamorphic and igneous rocks, were found; and similar beds occur at intervals down to the greatest depth reached. Up to the present time no contemporaneous organic remains have been found in these deposits.

Fossil plants from Ardtun in Mull, exhibited by Mr. J. Starkie Gardner. These plants are from a small patch of limestone beneath the gravels and silts of an old river course sealed up in the great trap flows of Western Scotland. The limestone is rather below the leaf-bed found at Ardtun by the Duke of Argyll, and directly overhangs the sea, the cliffs beneath being columnar and worn into caverns. The plants were until recently believed to be Miocene, but are now recognized to be very low down in the Eocene—*vide* recent writings of Sir W. Dawson and the Marquis de Saporta. The same plants ranged over Greenland and North America during the Tertiary, perhaps not synchronously, and an allied flora seems to exist at the present day in China and Japan.

Photographs illustrating experiments in mountain-building, exhibited by Mr. Henry M. Cadell, H.M. Geological Survey of Scotland. These have already been referred to in NATURE.

Set of thermometers specially constructed by Casella for use by Mr. Symons in determining the present temperature of the mineral springs in the Pyrenees, exhibited by Mr. G. J. Symons, F.R.S.; and Immisch's avitreous thermometer, constructed for the above investigation. This thermometer is absolutely perfect, its verification at Kew, before and after its use in the Pyrenees, being 0° at all points from 50° to 130°.

An apparatus for determining the hardness of metals or other substances, exhibited by Mr. Thomas Turner.

Robertson's writing telegraph, exhibited by Mr. John M. Richards.

A Coulomb-meter, exhibited by Prof. George Forbes, F.R.S. This consists essentially of a conductor of iron wire in the form of a spiral, or a double ring with cross wires. Above the conductor a set of vanes is pivoted. This consists of a circular disk of mica with a hole in the centre in which is fixed a paper cone carrying at its apex a pinion with a concentric ruby cup. Round the circumference of the mica disk eight small cylinders of pith are fixed at equal distances, and eight vanes inclined at 45° to the mica

disk are attached to the pith cylinders, these vanes being made of the thinnest mica. This set of vanes is supported by the ruby cup resting on a steel point fixed to the base of the instrument. The pinion engages with the first wheel of a train of wheelwork actuating the indexes, which show upon dials the number of revolutions made by the vanes. The action of the instrument is very simple. The electric current passing through the iron conductor creates heat, which sets up a convection current in the air, and this causes the vanes to rotate about the vertical axis and drive the clockwork. The number of revolutions indicated on the dials is, through a considerable range of currents, an exact indication of the number of coulombs or ampere-hours which have passed through the conductor. The friction of the ruby cup on the pivot determines the smallest current which can be accurately measured, and the friction of the clockwork is barely perceptible. The resistance of a meter to read from 1 ampere upwards is 0.02 ohm.

Electrical translucent balloon for flashing signals by night, invented and exhibited by Mr. Eric Stuart Bruce.

The new iridio-platinum incandescent gas-burner (Lewis and Sellon's patents), exhibited by Messrs. Johnson, Matthey, and Co.

Apparatus for measuring the changes produced by magnetization in the dimensions of rods and rings of iron and other metals, exhibited by Mr. Shelford Bidwell, F.R.S. The instrument exhibited is capable of measuring changes of length to a millionth of a millimetre or a twenty-five-millionth of an inch. An iron rod when magnetized becomes (as is well known) at first slightly lengthened. But if the magnetizing force is sufficiently increased it again contracts, and ultimately becomes actually shorter than when unmagnetized. A cobalt rod contracts under magnetization, reaching a minimum length in a field of about 500 C.G.S. units, beyond which point it becomes longer. A nickel rod also contracts; the limit of its contraction not having been reached with the greatest magnetizing forces yet used. Bismuth is slightly elongated in intense fields. (See Proc. Roy. Soc., vol. xliii., 1888, p. 406.)

Experiments illustrating low-temperature spectra, in connection with the spectra of meteorites, shown by Mr. J. Norman Lockyer, F.R.S.

Skeleton of an Akka, a Negro tribe from Central Africa, the smallest known race of men. (Height exactly 4 feet.) Sent by Dr. Emin Pasha for the British Museum, and exhibited by Prof. Flower, C.B., F.R.S.

Charts showing lines of equal values of the magnetic elements (epoch 1880)—declination or variation, inclination or dip, horizontal force (British units), vertical force (British units)—exhibited by Staff-Commander E. W. Creak, R.N., F.R.S. From the original charts at the Admiralty, compiled by Staff-Commander E. W. Creak, and prepared in their present form for the "Report on the Magnetical Results obtained in H.M.S. Challenger," in the concluding volume of the "Voyage of H.M.S. Challenger." The small maps show—(1) The track of H.M.S. Challenger where magnetic observations were made. (2) The approximate distribution of the secular change in the declination or variation (epoch 1840-80).

Photographs of the polar axis of a 5-foot telescope, December 1887, January 1888, exhibited by Mr. A. A. Common, F.R.S.

Sir William Thomson's models of foam or froth consisting of equal bubbles, exhibited by Prof. G. H. Darwin, F.R.S. Each bubble is a curvilinear fourteen-faced space. If a single bubble be dissected from the mass, it is found to be derived from the regular octahedron (two square pyramids base to base) by truncating the six solid angles. Thus the eight faces of the octahedron give rise to eight curvilinear hexagons, and the six solid angles to six solid curvilinear squares. In the foam three films meet at 120° at each edge, and of the three which meet two are hexa-

gons and one is a square. (See *Phil. Mag.*, vol. xxiv., 1887, p. 503.)

Model of maximum pressure anemometer, designed by Mr. Whipple, Superintendent of Kew Observatory, exhibited by the Kew Committee. In this instrument eight small metal disks, each of 0.01 foot in area, are supported vertically against the wind by levers weighted in accordance with the various pressures of the wind on Beaufort's, or some other accepted scale of force. A vane keeps their surfaces normal to the wind's direction. By their displacement the maximum wind pressure during any desired period is registered. The large perforated disk against which they are pressed serves the purpose of removing the indicating disks beyond the action of the eddies of the wind playing round the edges of the plate.

Specimens of gold showing the effect of small quantities of impurity on the fracture of the metal, exhibited by Mr. W. C. Roberts-Austen, F.R.S.

Miners' electric safety-lamps, exhibited by the Schanschiff Electric Light and Power Company. (1) A three-cell lamp capable of giving $1\frac{1}{2}$ candle-power for 9 hours. Each cell contains 5 fluid ounces of solution, and consumes $\frac{3}{8}$ pound of zinc in 48 hours. The light is more than four times more powerful than that of the Clanny oil lamp, and its working cost is $\frac{1}{2}d.$ per shift of 9 hours, or $3\frac{3}{4}d.$ per week. The weight when fully charged is about $3\frac{1}{4}$ pounds. The elements consist of carbon and zinc, and the excitant is a mercurial solution of Mr. Schanschiff's invention. (2 and 3) Four-cell batteries, one round and one square. Each cell contains 5 fluid ounces of solution, and at a cost of $1d.$ furnishes a light of nearly 2 candle-power for 9 hours. The weight when fully charged is $4\frac{1}{2}$ pounds. (4) A four-cell reversible battery, *i.e.* put in or out of action by reversing it. The charge consists of 24 ounces of solution, and giving a light of 2 candle-power will burn from 10 to 12 hours at a cost of $1d.$ The batteries can be used for many purposes other than mining-lamps, *viz.* for microscopical purposes, house-lighting, photography, diving, railway-lighting, gun-firing, gas-works, &c.

THE ZOOLOGICAL SOCIETY OF AMSTERDAM.

THE celebration of the jubilee of the Zoological Society of Amsterdam (*Natura Artis Magistra*), on Tuesday and Wednesday, May 1 and 2, passed off with great *éclat*. Dr. Westerman, who has been Director of the Gardens for more than fifty years, may well be congratulated on the success of the jubilee *fêtes*; and the vigour with which he spoke at the banquet on May 1, and again at the distribution of honours on Wednesday, shows that his eighty years sit lightly upon him. One of the most interesting features of the jubilee commemoration was the performance of a festival cantata, specially composed for the occasion by Mr. De Langa, and this had to be repeated on Thursday for the benefit of half the members of the Society, for whose accommodation the enormous concert-room proved insufficient on the opening day. All the streets in the vicinity of the Zoological Gardens were gaily decorated with flags, and the rooms of the Society were ornamented in the day-time by a mass of gorgeous flowers and at night with brilliant illuminations. After the reception of the guests by the Committee on Tuesday morning, an adjournment was made to the King's Saloon, which was densely crowded, to hear an address from Prof. Stockvis. Luncheon followed, and then the cantata was given in the concert hall, and in the afternoon the new Ethnographical Museum was formally opened. The excellent way in which the collections had been arranged was generally remarked, and the Curator, Mr. Pleyte, was warmly congratulated. The public spirit which characterizes modern Amsterdam will doubtless soon cause this

new Museum to become famous, as there is a vast field for research among the Netherland possessions in the East Indies. At the banquet in the evening, covers were laid for nearly 200 persons, and after the usual toasts, the health of the Queen of England was drunk by the assembled company with the greatest enthusiasm, and was responded to by Mr. Bowdler Sharpe, of the British Museum, who spoke in English, and took the opportunity of thanking the Dutch nation for the hospitality which he and his countrymen always received from the Netherlanders, to which he could testify from an experience of over twenty years. Speeches were also given by the Ministers of Finance and of the Interior, the Burgomaster of Amsterdam, and others; and the company then adjourned to witness a torchlight procession of students, who sent a deputation of their Senate to congratulate the venerable Director and the Committee of the Society. The young President of the Students' Senate, Mr. Van Schevichaven, made a most eloquent address, and was enthusiastically received. On Wednesday, May 2, a special reception of the Committee was held to confer diplomas on the new honorary members, and Prof. Hubrecht, of Utrecht, Dr. Jentink, the Director of the Royal Museum of Natural History at Leyden, and Mr. Büttikofer, of the same Museum, were the first recipients; being followed by Mr. A. D. Bartlett, the Superintendent of our Zoological Gardens in the Regent's Park, and Mr. Bowdler Sharpe. Amongst those who were unable to be present, but to whom the honorary membership of the Society was given, were Prof. Flowers, Dr. A. B. Meyer, &c. The large bronze medal of the Society was conferred on Mr. Charles Jamrach and Mr. G. A. Frank for services rendered in the formation of zoological collections, as well as on several other well-known zoologists. Mr. Jansen, the Librarian of the Society, and Mr. F. E. Blaauw, the Secretary, also received medals and diplomas. The latter gentleman has a large private menagerie, and is an enthusiastic supporter of the Society. Simultaneously with the festival celebration, the Society has issued a jubilee number of its *Bijdragen tot de Dierkunde*, containing several important memoirs, of which the following is a list:—(1) The opening address of Prof. Stockvis. (2) Mr. Maitland's review of the Society and its work, with a plan of the Gardens. (3) An account of the aquarium with 2 plates, by Dr. C. Kerbert, the Curator. (4) A list of all the animals which have lived in the Gardens from 1838 to 1888 by Mr. K. N. Swierstra. (5) A list of the birds of the Netherlands, by Mr. H. Koller, with an enumeration of the specimens in the Society's collection. (6) Description of a new species of *Proechidna* (*P. villosissima*) and an account of *Canis jubata*, by Prof. Max Weber: this article is illustrated by 2 plates. (7) A list of the *Macrolepidoptera* of Holland, by Dr. J. T. Oudemans. The Gardens of the Society seemed to be in flourishing condition, and the collections of Cranes and Antelopes were as remarkable as ever.

NOTES.

THE ceremony at Utrecht on May 28 to celebrate the seventieth birthday of Prof. Donders, and his consequent retirement from his Professorship, will comprise a formal presentation, at 1.30 p.m., of the sum collected, together with the roll of subscribers, and a public dinner at 5.30 p.m. After the ceremony of presentation the Professor will name the scientific purpose to which he proposes that the fund shall be applied. The complete list of subscribers from this country is to be seen in our advertising columns on page xviii. Any subscriber may verify the amount of his subscription by applying to Mr. Brailey, 11 Old Burlington Street, where the audited list may be seen. The total amount collected here is £280 11s. 10d. Prof. Humphry, Dr. Hughlings