1 and 2), putting the nuclear charge proportional to the atomic weight, found values, however, showing, not constancy, but systematic deviation from (mean values) 3·825 for Cu to 3·25 for Au. If now in these values the number M of the place each element occupies in Mendeléeff's series is taken instead of A, the atomic weight, we get a real constant (18·7±0·3); hence the hypothesis proposed holds good for Mendeléeff's series, but the nuclear charge is not equal to half the atomic weight. Should thus the mass of the atom consist for by far the greatest part of α particles, then the nucleus too must contain electrons to compensate this extra charge.

Table of the Ratio of the Scattering per Atom Divided by A^2 Compared with that Divided by M^2.

	I.	II.	Mean	Mean ×5·4	Mean ×A^2/M^2	M
Cu ...	3·7	3·95	3·825	20·6	18·5	29
Ag ...	3·6	3·4	3·5	18·9	18·4	47
Sn ...	3·3	3·4	3·35	18·1	19·0	50
Pt ...	3·2	3·4	3·3	17·8	18·6	82
Au ...	3·4	3·1	3·25	17·5	18·4	83
Mean ...	3·44	3·45	3·445	18·6	18·6	

A. VAN DER BROEK.

Gorssel, Holland, November 10.

The Stone Implements of the Tasmanians.

IN reply to Mr. J. P. Johnson's letter on Tasmanian stone implements in NATURE of November 13, attention may be directed to the paper read by M. Exsteens before the International Prehistoric Congress at Geneva last year, and destined to appear in vol. ii. of the *Compte-rendu*. It seems that the common opinion in Europe as to the culture represented by these relics of a recently extinct race was based principally on rejects from a large collection; and an inspection of the better worked specimens is sufficient to upset their eolithic origin in favour of a later stage, viz. Le Moustier-Aurignac, which is precisely Mr. Johnson's view. In 1906 the Rev. C. Wilkinson and Mr. Anthony presented a small but typical series of that character to the British Museum.

REGINALD A. SMITH.

Society of Antiquaries of London,
Burlington House, W., November 18.

Museum Glass.

IN connection with a work I am writing on "The History of Anatomy," I have been induced to trace the rise of the anatomical museum, and this appears to have depended to a larger extent than one would have suspected on the price of spirit and museum jars. In the second half of the eighteenth century John Hunter was using about 5000 museum jars for his spirit preparations. It would be interesting to learn whether these were made specially to his order, as I suspect, which firm he dealt with, and how much he was charged. Perhaps some old-established glass manufacturers can give me some isolated or continuous records of the prices of circular and rectangular glass jars used in museum work, and also the period when they were first manufactured in the ordinary course of business routine. From 1750 to 1850 is the period of most importance.

F. J. COLE.

University College, Reading, November 15.

CAPTAIN SCOTT'S LAST EXPEDITION.[1]

CAPTAIN SCOTT'S last journal has the deep interest of one of the most tragic documents in the history of exploration, for the fate of his party on its return from its magnificent and successful journey will surround his name with the romance that immortalises those of Franklin and of Burke and Wills. The human interest of Captain Scott's journals is greater than the geographical, for his route by the Beardmore Glacier was the same as that of Shackleton to one hundred miles from the Pole, and the remainder of the route was over a plateau with no special features of interest apart from its position. The reader therefore naturally hurries through the accounts of the voyage out, the landing on the middle of the western coast of Ross Island, the depôt laying in the first season, the happy life at the winter quarters, and the reports of enthusiastic scientific investigation by the staff. He will read with pleasure the eulogies of Dr. Wilson and the tributes to the capacity and enterprise of all the members of the expedition; and he may note, too, that Captain Scott started greatly preferring ponies to dogs, and that the old *Discovery* hut was used as an intermediate station on the way to the Barrier; the remarks that it was cold is not surprising, since half its heating apparatus had been left in New Zealand, and the insulating material on which its warmth depended was not inserted.

The Southern Party, with its various supporting parties, started between October 24 and November 3, with sledges drawn by motors, ponies, and dogs; and this part of the narrative inevitably recalls the old maxim against mixed transport. The transport was, however, gradually unified by the failure of the motors and the shooting of the ponies, the flesh of which was used as food, mainly for the dogs. After the fateful return of the dogs from the lower end of the Beardmore Glacier on December 12, the journey was continued with man-hauled sledges, with the aid of two supporting parties, which returned later. Eighteen miles from the Pole came the discovery of a camp and many dog tracks, followed by finding Amundsen's tent and letters, which have given conclusive evidence that both parties reached their goal.

The interest increases in the story of the return march, maintained with heroic persistence in spite of the ever-growing difficulties and weakness, which led to the final tragedy only eleven miles from the ample store of food and fuel at One Ton Depôt. There is no direct statement as to the real cause of the disaster. Dr. Wilson's diary may be expected to contain more explicit evidence; but though various extracts from Dr. Wilson's diary are quoted on comparatively unimportant details, there is none regarding the main problem. The

[1] "Scott's Last Expedition." In 2 vols. Vol. i., Being the Journals of Captain R. F. Scott, R.N., C.V.O. Pp. xxvi+633+plates. Vol. ii., Being the Reports of the Journeys and the Scientific Work undertaken by Dr. E. A. Wilson and the Surviving Members of the Expedition. Pp. xv+534+plates. Arranged by Leonard Huxley. With a Preface by Sir Clements R. Markham, K.C.B., F.R.S. (London: Smith, Elder and Co., 1913.) Price 42*s*. net.

gradual collapse of Evans with his shed finger nails, burst blisters, suppurating wounds, and mental lethargy, the swelling of the feet which gradually affected the whole party, and the few other symptoms stated, and those which may be read between the lines, all indicate scurvy as the cause of the gradual weakening of the party; and as the provisions had been cut down to a minimum, the slow progress rendered necessary the reduction of the daily rations. The fall which is said possibly to have injured Evans is apparently hypothetical, and would have happened so late in his illness that it would be an effect, and not a cause. The explanation that the party was finally stopped in the journal are ennobled by the magnificent courage with which the men awaited their slow but inexorable doom.

The second volume consists of the narratives of the subsidiary expeditions and preliminary statements of the scientific work accomplished, and thus calls here for longer notice. It would have been convenient if the names of the authors had been given in the list of contents. The volume opens with an account of the arduous journey by Dr. Wilson, Lieut. Bowers, and Mr. Cherry-Garrard in the mid-winter of 1911 to the Emperor Penguin rookery on the edge of the Barrier. This bird nests in the coldest season of the year, and

Photo.] FIG. 1.—Amundsen's tent at the South Pole. From "Scott's Last Expedition." [*Lieut. Bowers.*

by a ten days' blizzard is inadequate, for though meteorological observations are not given for all the days between the arrival at the final camp and Capt. Scott's last entry, the weather to the north during part of the time is described as cold but fine; and though blizzards may be local, it seems most improbable that one should have lasted sufficiently long to have prevented the last march of eleven miles to One Ton Depôt, unless the men had been incapacitated by weakness.

Dr. Wilson's journals may contain more precise information, but from the general evidence in Captain Scott's, it appears probable that scurvy was responsible for the disaster. The last pages as knowledge of its embryology might give very interesting results, an expedition was made to collect the young eggs. According to the opinion quoted in vol. ii., p. 77, Captain Scott considered this journey to have been the hardest which has ever been done. The temperature recorded of −77° F. has only been exceeded in Siberia.

The narrative of the Northern Party is given by Commander Campbell, who, with Dr. Levick, Mr. Priestley as geologist, and three men, were sent in the *Terra Nova* to reach King Edward Land, east of the Barrier. The steamer was unable to penetrate the pack ice, and according to the alternative instructions from Captain Scott, the

party was landed at Cape Adare at the winter quarters of the Southern Cross Expedition. It therefore became the Northern instead of the Eastern Party. Cape Adare proved an unsatisfactory base, as the effort to explore the coast to the west proved impossible owing to the unfavourable condition of the ice. The party was confined to a more detailed survey of Robertson Bay. In the following spring the six men were transferred to Terra Nova Bay for a summer's work in that district. The *Terra Nova* was unable to relieve them in the autumn, owing to the thickness of the pack ice and, as they had been landed with only stores and equipment for the summer, they had to live through the winter on the resources of the country. Seals and penguins provided their food and fuel; they dug a dwelling house in a snowdrift, and after a winter of great privations they sledged down the coast to McMurdo Sound; they found a food cairn just in time, and were shortly afterwards rescued by the *Terra Nova*. It appears from Commander Campbell's narrative that they began the winter with very slight hope of living through it, and their survival reflects the highest credit on their courage, resource, and good comradeship.

The remaining narratives are the record of the ascent of Mt. Erebus by Mr. Priestley, of the last year's life at Cape Evans and the search for the Southern Party by Dr. Atkinson, and of the various voyages of the *Terra Nova* by Commanders Evans and Pennell.

Photo.] FIG. 2.—The ramparts of Mount Erebus. From "Scott's Last Expedition." [*Mr. H. G. Ponting.*

The last section of the volume consists of general sketches of the scientific work undertaken during the expedition, but most of these are mainly statements of the work undertaken, for it is of course too early to know the results. They will obviously prove very important. Two of the most complete sections are those on the geological work on the mainland west of McMurdo Sound by Mr. Griffith Taylor and Mr. Debenham. Mr. Taylor reproduces an interesting diagram by Prof. David showing the striking resemblance in structure between the coast of South Victoria Land and the Pacific coast of Australia. The geological collections and observations have not yet been worked out, but sufficient is announced to show that very

important results were secured. According to the first accounts, this coast includes granites of two ages. Prof. David and Mr. Priestley, during the Shackleton Expedition, referred all the granites to one period; according to the present volume (p. 433), the granites are of infinite variety, and probably belong to many ages. The majority are assigned to the interval between Cambrian times and the deposition of the Beacon Sandstone; and perhaps the most important contribution that is promised by this expedition is the determination of the age of these sandstones owing to the discovery of some fossil plants, which are said to be much better than the indefinite remains collected by the two previous expeditions. The specific identification of the fossils is expected, and they are said to indicate a late Palæozoic age. Further details are given of the great dolerite sill intruded into the Beacon Sandstone, and from the description it appears to be strikingly like that which forms the most conspicuous feature on the central highlands of Tasmania. Some copper ore was found on the cliffs at Cape Bernacchi.

Mr. C. S. Wright describes the nature of his observations on the properties of ice, and briefly discusses the cause of the northward flow of the Barrier. It is now universally agreed that the Barrier is due to the accumulation of snow, as first suggested in NATURE, and as the ice is afloat close to its landward end, it can only flow northward; and if the snowfall is continuous across it the velocity is necessarily greatest along its northern edge. Mr. Wright has also described the magnetic, electrical, and pendulum observations, and the measurements of the radioactivity of the air.

The biologist, Mr. Lillie, has given a short summary of the zoological work, and as fifteen rich trawl hauls were made, many new species may be expected. He remarks, however, while though there is an extraordinary wealth of individuals, the variety of forms is not very great, whereas the one Antarctic haul of the *Challenger* contained the highest proportion of new forms. But Mr. Lillie's result is what would have been expected, especially in the shallower waters.

The meteorological report by Dr. Simpson, though he says it will take years to work out the full results, contains some interesting suggestions. One passage illustrates the malicious irony of fate. He points out "one can now say definitely that the blizzards which have been so fateful to British Antarctic exploration are local winds confined to the western half of the Ross Barrier" (vol. ii., p. 463). He adds: "If this had been known previously, the history of the conquest of the South Pole would have been very different." Dr. Simpson was originally selected as the physicist for the expedition of the *Discovery*, but he was rejected on the grounds of health by the naval medical authorities. If he had gone on that expedition its observations on its chief meteorological problem would not have been set aside as unintelligible, and his conclusion would no doubt have then been so clearly recognised that the great Antarctic tragedy might never have occurred.

Both volumes are superbly illustrated by photographs by Mr. Ponting, including one in natural colours, and by coloured plates after the beautiful sketches by Dr. Wilson. J. W. G.

RADIUM RESOURCES.

AN address to the sixteenth annual convention of the American Mining Congress, Philadelphia, October 20–24, by Mr. C. L. Parsons, of the Division of Mineral Technology, Bureau of Mines, is published in *Science* of October 31, dealing with the present commercial situation as regards radium and its ores, the available sources of radium in America and elsewhere, the prospecting for, concentration, and costs of mining carnotite, and the probable future of radium in the treatment of disease. A bulletin is about to be issued by the Bureau of Mines, and an advance statement was issued in April directing attention to the fact that in 1912 nearly three times as much radium in the form of carnotite deposits was produced from Colorado as from all the rest of the world put together, and was exported almost entirely to Europe.

The publication of this statement has already resulted in a considerable increase in the selling price of the material, and has rendered ores containing less than 2 per cent. of uranium oxide saleable, whereas before they were worthless. American carnotite is found in several districts in Colorado (Montrose and San Miguel counties), the Paradox Valley being described as the richest known radium-bearing region of the world, and in Utah, north-west of these counties, the deposits of which are of lower grade, but cost less in transportation than those of Colorado. In the latter case (Paradox Valley) mining costs 28 dollars to 40 dollars, and hauling charges to the railway 18 dollars to 20 dollars. The costs in the European markets average 70 dollars, and a 2 per cent. ore at Hamburg now sells at 95 dollars per ton. Mechanical concentration has been successfully employed, and it appears can save at least one-half of the material now wasted.

The equilibrium amount of radium (element) in a 2 per cent. U_3O_8 ore is about 5·25 milligrams per ton. The actual amount present in carnotite may safely be reckoned to be at least 4 mg., which, when extracted, sells for about 100*l.* Of this sum 20*l.* represents cost of raw material, leaving 80*l.* per ton margin for the cost of extraction and profits of the manufacturer and salesman.

Efforts are being made to foster the production of radium in the U.S.A., for although the total value of the world's output is insignificant, compared with that of commoner materials, being estimated for 1912 as 1,000,000 dollars, its potentialities in work for the public knowledge and public weal cannot be measured in cash. A National Radium Institute has been formed, working in conjunction with the Bureau of Mines, for