survivor of the white rhinoceros being met with, it may be carefully preserved for the National Collection at South Kensington.

As will be seen by the outline drawings of the heads,[1] the points by which this part of the two animals may be distinguished present themselves very appreciably. In the first

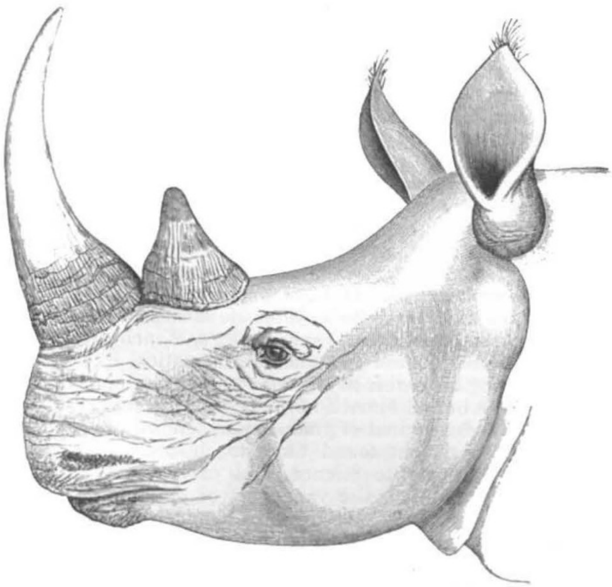

FIG. 1.—Head of *Rhinoceros simus*.

place, as is already well known, the "white" or "square-mouthed" rhinoceros (as it is much better called) is distinguished by its short upper lip. In *R. bicornis* the central portion of the upper lip is far extended, and forms a quasi-prehensile organ. This is sufficiently manifest in the drawing, but may be still better seen in the living example of the same animal now in the Zoological Society's Gardens.

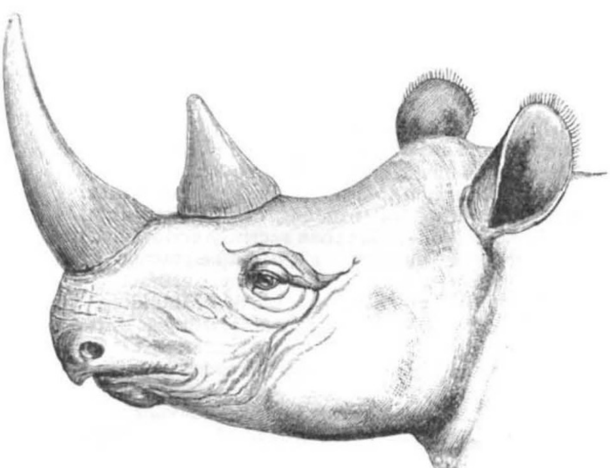

FIG. 2.—Head of *R. bicornis*.

A second point in which the heads of the two African rhinoceroses differ materially is in the size and shape of the ears. In *R. bicornis* (Fig. 2) the ear-conch is much rounded at its extremity, and edged by a fringe of short black hairs which spring from the margin. In *R. simus* (Fig. 1) the ear-conch is much more elongated and sharply pointed at its upper extremity, where the hairs which clothe its margin constitute a slight tuft. While the upper portion of the ear-conch is much more expanded in *R. simus* (than in *R. bicornis*), in the lower portion the two margins are united together for a much greater extent, and form a closed cylinder which rises about 3 inches above the base.

A third point in which the two species appear to differ is in the shape of the nostrils, which in *R. simus* are elongated in a direction parallel with the mouth, while in *R. bicornis* they are more nearly of a circular shape. Again, the eye in *R. simus* appears to be placed further back in the head than in *R. bicornis*.

In conclusion, I wish to call special attention to what Mr. Selous has already said—that no museum in Europe or America possesses a specimen of this huge animal, and to point out that the country, in which alone (as is possible but by no means certain) the last stragglers exist, being now within the British Empire, it is clearly our duty to endeavour to obtain and preserve examples of the great white or square-mouthed rhinoceros for the use and information of posterity.

P. L. SCLATER.

[1] Reduced from P.Z.S., 1886, Pl. xvi.

RECENT RESEARCH AMONG FOSSIL PLANTS.

AN instructive *résumé* of recent work among fossil plants is given by the Marquis de Saporta in the *Revue générale de Botanique*, vol. ii., 1890. It appears that mosses were almost certainly represented in the Palæozoics, a species allied to Polytrichum having been discovered at Commentry, in France. Rarely as the fructification of ferns is preserved in the Coal-measures, twenty species are now investigated, confirming the view that the Palæozoic species differed widely from the present. Half of them are most nearly related to the Marattiaceæ, whilst others show affinities with the Osmundaceæ, Gleicheniaceæ, and Hymenophyllum, the vast order of Polypodiaceæ, and the Cyatheæ being unrepresented. Among the most striking discoveries in the Coal-measures is a fern trunk several yards in length, with its fronds attached. The view that the Calamarias were in part Gymnosperms is all but universally abandoned, and the close affinity of the Lepidodendrons and Sigillarias and their cryptogamic nature everywhere admitted, so that a long controversy is ended, and the truth of Prof. Williamson's contentions definitely established. Links in the chain of evolution between Cryptogams and Gymnosperms still elude our search, and the earliest vegetation of which we have any complete knowledge already presents well-developed Gymnosperms in the shape of the deciduous Cordaïtes, a few Cycads and obscure Taxads allied to Ginkgo. At the same time, we get rid of the very puzzling Spirangium, so often regarded as a possible Palæozoic Angiosperm, but now relegated by MM. Renault and Zeiller to the animal kingdom as the egg of some member of the shark family.

Under the apparently totally dissimilar climatic conditions of the Mesozoic, the overgrown luxuriant vegetation of the coal period is replaced by forests of dry scale-leaved Coniferæ, with undergrowths of small-leaved ferns and Cycads. Fructification shows the presence of Cycadeæ in the infra-Lias, and Polypodieæ in the mid-Jurassic. The researches of Count Solms into the organization of the obscure and extinct Cycad Bennettites, bid fair to clear up another important and hitherto insoluble problem—the true botanical position of Williamsonia. Work in the past year or so has been destructive to a great deal of even recent literature on the geological history of plant evolution, the foundations of all speculative writing on this subject having as yet proved most treacherous sand.

The first appearance of Dicotyledons, once supposed to coincide with the Tertiary period, is pushed back farther and farther into the Secondary; a flora in the United States, otherwise Jurassic in facies, containing no less than seventy-five species, or more than 20 per cent. of Phanerogams, according to Lester Ward. In England the mysterious Wealden, which from analogy should preserve rich fossil floras shedding light on the origin of Angiosperms, yields little but tubers and stems of Equisetum, scraps of ferns and conifers, and a unique liliaceous stem; while our Greensands, Gault, and Chalk afford little or nothing from which the existence of flowering plants during their deposition could be inferred. The veil which has proved absolutely impenetrable in our country, and has so long enshrouded the dawn of dicotyledonous vegetation, seems, however, about to be lifted, and we wait with the utmost interest the publication of the infra-Cretaceous floras of the Potomac by Prof. Fontaine, and of the oldest European Dicotyledons, from the beds of Gault age in Portugal, by Saporta. Though, however, the forms will be revealed, a long time must probably elapse before we can hope to rightly interpret them.

J. STARKIE GARDNER.

ON THE INFLUENCE OF HEAT ON COPPER POTASSIUM CHLORIDE AND ITS SATURATED SOLUTION.[1]

THE blue crystals of copper potassium chloride, $CuCl_2.2KCl.2H_2O$, when heated to upwards of 100°, change their colour, and a closer investigation proves such is due to the formation of a new brown salt, $CuCl_2.KCl$, according to the equation—

$$CuCl_2.2KCl.2H_2O = CuCl_2.KCl + KCl + 2H_2O.$$

This same new substance can be obtained at lower temperatures, on heating the blue double salt in presence of copper chloride; it then results according to the following symbols—

$$CuCl_2.2KCl.2H_2O + CuCl_2.2H_2O = 2CuCl_2.KCl + 4H_2O.$$

Both transformations are reversible—*i.e.* the primitive substances are obtained anew on cooling, and both take place at definite temperatures, 93° and 56° respectively, which temperatures can be accurately determined in studying the abrupt change of volume which accompanies that of chemical composition.

The temperatures of 56° and 93° are, moreover, characterized by an intersection of three curves of solubility in each case, viz.—

1. At 56° the following three will meet—

(*a*) That of the system $CuCl_2.2KCl.2H_2O$; $CuCl_2.2H_2O$.
(*b*) That of the system $CuCl_2.2KCl.2H_2O$; $CuCl_2.KCl$.
(*c*) That of the system $CuCl_2$ KCl; $CuCl_2.2H_2O$.

2. At 93°—

(*a*) That of the system $CuCl_2.2KCl.2H_2O$; ClK.
(*b*) That of the system $CuCl_2.2KCl.2H_2O$; $CuCl_2.KCl$.
(*c*) That of the system $CuCl_2KCl$; ClK.

Lastly, those same temperatures are characterized also by an intersection of four vapour pressure lines at each, viz.—

1. At 56° those of the above-mentioned three saturated solutions, and that of the dry blue salt, mixed with copper chloride, meet.

2. At 93° those of the other three mentioned above and that of the dry blue salt, mixed with potassium chloride.

J. H. VAN'T HOFF.

[1] Abstract of a paper read at the Leeds meeting of the British Association.

THOMAS CARNELLEY.

BY the death of Prof. Carnelley the science of chemistry in this country has suffered an irreparable loss. It appears that some little time ago Dr. Carnelley had been suffering from an attack of influenza, and it was whilst returning to Aberdeen after a journey to the south, made with the object of recruiting his health, that he was seized with sudden and severe illness, which was due, as his medical attendants discovered, to the formation of an internal abscess. Surgical aid proved unavailing, the patient's strength gradually gave way, and Dr. Carnelley passed away at mid-day of August 27, at the comparatively early age of thirty-eight.

Prof. Carnelley was a native of Manchester, the son of Mr. William Carnelley, Chairman of the directors of Messrs. Rylands, Limited, of that city. His early education was received at King's College School, London, and it was during this period, whilst attending the evening classes at King's College, that Carnelley began the study of that science with which he in after life identified himself. In 1868 he entered the Owens College, Manchester, gaining one of the Dalton Entrance Mathematical Exhibitions. During his career as a student, an exceptionally brilliant one, he busied himself not only with the study of the many subjects required of graduates in science of the London University, but found time to devote special attention to his favourite science, and carried out an original investigation on the vanadates of thallium, for which he received in 1872 the Dalton Chemical Scholarship. In this year also he obtained the degree of Bachelor of Science of the University of London, gaining at the final examination for this degree marks qualifying for the scholarship in chemistry, in consequence of which he held the Dalton Chemical Scholarship for an additional year. During the next two years he acted as private assistant to Prof. Roscoe, and commenced his career as a teacher by giving lectures in connection with the evening classes of the Owens College. During the year 1874-75 he continued his studies at the University of Bonn under Profs. Kekulé, Zincke, and Wallach; and on his return to England in 1875 was appointed Demonstrator and Assistant-Lecturer in Chemistry in the Owens College under Prof. Roscoe. During the time that he held this appointment he also acted as Principal of the North Staffordshire School of Science at Hanley, where his teaching proved eminently successful. In 1879 Carnelley, who had taken the London degree of D.Sc., was appointed to the newly-founded chair of chemistry in the Firth College, Sheffield, and, after three years' successful work in this institution in fitting up the chemical laboratory and inaugurating the teaching of chemistry in this College, he passed on to the then recently endowed University College of Dundee. Here ample means were placed at his disposal, and he had the satisfaction of superintending the erection of a block of buildings in which are located the chemical laboratories, lecture-rooms, &c., which he had designed and carefully planned. Under his guidance the Chemical Department of the Dundee College rapidly developed; his enthusiasm, his forgetfulness of self, his unstinted energy, and his ability and zeal as a teacher, all combined to make his department the most important one in the new College and to endear him to his students. Signally successful as was Carnelley's career in Dundee as a professor of chemistry, he also in many other ways conferred lasting benefits on the town and its inhabitants, amongst whom he spent six years, perhaps the most active of his life, and his acceptance of the appointment to the chair of chemistry at the University of Aberdeen in 1888 caused universal regret in Dundee.

Amidst his many duties, first at Owens College, then at Firth College, and afterwards at University College, Dundee, where he conducted both day and evening