

ART. VII.—*A Famous Fossil Cycad*; by LESTER F. WARD.

THERE is in the Museum of Mineralogy and Geology at Dresden a petrified trunk of a cycad that has been known for more than two centuries and a half. It is the type and only known specimen of *Cycadeoidea Reichenbachiana* (Göpp.) Cap. and Solms, the *Raumeria Reichenbachiana* of Göppert. It has the longest history of any specimen of its class, unless we count as history the thousand years or more that the type of *Cycadeoidea etrusca* lay upon an Etruscan tomb at Marzabotto before it was discovered by Count Gozzadini in 1867 and found its way in 1878 to the Geological Museum of Bologna.

When in 1894 I made a voyage to Europe chiefly for the purpose of studying the collections of fossil cycadean trunks in the various museums preparatory to the elaboration of those of America, I was not able to visit Dresden and see this specimen. In 1898 Dr. H. B. Geinitz sent me a photograph of it as it stood in the Dresden Museum resting on a wooden pedestal made to support it. This I reproduced in my memoir on the Cretaceous Formation of the Black Hills as indicated by the Fossils Plants,* explaining the circumstances in the text.† The photograph was not particularly clear and was of a light brown color, somewhat pale. The half-tone process by which it was reproduced brought out much that was latent in the photograph and the result is a considerably better view than the original. In studying this it was clear both that the petioles were descending and also that the sharp angle of the leaf scars was on their upper side, both of which features are very rare in cycad trunks. This raised the suspicion that the specimen might be inverted, and led me to remark in the footnote on page 605 of that memoir that, judging from the picture alone, "I should say that the trunk is here inverted, but to be certain it would be necessary to examine it. It is clear that in the present position the leaf scars have a decided downward direction, which is rare but not unknown (e. g., *C. Uhleri*). Moreover, the scars, which are subtriangular, have now their sharp angle upward, which, if the specimen is right side up, would indicate that the keel of the petioles was on the upper side, a condition which I have met with in only two other species, *C. aspera* and *C. insolita*."

On August 27, 1903, on my way from Vienna to Berlin, I stopped at Dresden and visited the Royal Museum. I readily found the specimen still standing upon the same support as when photographed by Dr. Geinitz. A glance at it was suffi-

* Nineteenth Ann. Rep. U. S. Geol. Surv., 1897-98, pl. lix.

† Ibid., pp. 601, 604, 605.

cient fully to justify the suspicion expressed in the above-quoted footnote, and it was clear that it stood on the somewhat even face presented by the transverse fracture through the middle of the trunk, while the much less even base, which, if the specimen had been placed in its natural position, would have required it to be supported by wedges or cement, was uppermost and distinctly showed its character as such. Dr. Johannes Victor Deichmüller, Directorial Assistant, who, in the temporary absence of the Director, was in charge of the Museum, and to whom I announced the object of my visit, was much interested in my account and kindly caused the specimen to be placed on a table where I could thoroughly examine all parts of it. I proceeded to describe it in my note-book, in which I systematically recorded all the visible features in the same manner as I have done for all the American trunks. As the specimen is regarded as constituting a species, and does, indeed, differ specifically from all others thus far known, these notes upon it form an adequate basis for the specific description. Before dealing with the systematic part, however, it will be of interest to give a somewhat detailed historical account of the specimen.

I. *History and Literature.*

Desiring to learn the authentic history of the discovery of this specimen and its removal to the Dresden Museum, I wrote to Dr. Deichmüller on my return to America, giving him such bibliographical references as I was able to find and requesting him to consult if possible the original publications. He was successful in finding the most important of the early documents, namely, the report of Christian Heinrich Eilenburg, who was the Director of the Dresden Museum at the time this specimen was acquired. It is printed in German and French and bears the following title:

Kürzer Entwurf der Königlichen Naturalienkammer zu Dresden. Dresden und Leipzig, in der Waltherschen Buchhandlung, 1755.

oder :

Description du Cabinet royal de Dresde touchant l'histoire naturelle. A Dresde et à Leipzig, chez George Conrad Walther, libraire du roi, 1755.

Dr. Deichmüller had the great kindness to copy out of this work and send me the following passages relating to the object under consideration :

“A large case in the sixth arcade contains petrifications from the vegetable kingdom, which always fixes the attention of connoisseurs. That which is most admired here is a magnificent

block of petrifications which M. Borlach, Counsellor of Mines, sent us from Poland. It weighs over 100 pounds, and is, in our opinion, only a mass of petrified Hippurites, or coral-cups, although a celebrated naturalist entertains the view that this superb mass may be the summit of a palm tree turned to stone." (P. 23 of the French and p. 24 of the German).

Dr. Deichmüller also found in the library of the Dresden Museum the original manuscript catalogue in Eilenburg's handwriting and never published, bearing the title: "Lithoxylorum seu lignorum petrefactorum varii generis variæque speciei Catalogus Novus in quo simul osteocollarum et lignorum fossilium præsens collectio indicata est a Christiano Henrico Eilenburgio, MDCCLIII." On page 41 of this catalogue occurs the following entry written in Latin: "No. 76. A segment certainly of petrified palm wood, the fibers and stems so distinct that they would be taken for combustible wood unless the contrary is shown by handling and weighing. A certain projecting knot surrounded by regularly arranged natural rows and fibers calls for special attention in this remarkable petrification; but the structure is the same above and below and such that we are able to see that it penetrates through the entire thickness of the trunk. From Poland."

The specimen was first figured by George Wolfgang Knorr in his well-known "Sammlung von Merkwürdigkeiten der Natur und Alterthümern des Erdbodens oder versteinte und andere gegrabene Körper in illuminirten Kupfertafeln," of the text for which he only lived to write the first fascicle of 36 folio pages (Nürnberg, 1755). This did not include the description of this specimen. The remainder of the text was written by Johann Ernst Immanuel Walch, and published as a separate work with the title: *Die Naturgeschichte der Versteinerungen zur Erläuterung der Knorr'schen Sammlung von Merkwürdigkeiten der Natur*, Nürnberg, Erster Theil, 1773, Zweyter Theil, Erster Abschnitt, 1768, Zweyter Abschnitt, 1769, Dritter Theil, 1771, Vierter Theil, 1773. This work is usually preceded by Knorr's fascicle and accompanied by the atlas as a separate volume, the whole being known as the work of Knorr and Walch. The plates of the atlas are numbered in an almost incomprehensible manner, but the figure occurs on Plate IIIa of the Supplement, which is really the 220th plate of the work, of which it is figure 6. No one who has seen the specimen would ever recognize this as being a figure of it, as it does not show either the shape or the markings at all correctly.

In Walch's description of it, which occurs on pages 150-152 of the third part, nothing is said of the defects of Knorr's figure, and he confines himself to a general treatment of the specimen. He quotes extensively from what he calls "Rath

Eilenburg's *Beschreibung der Dresdner Naturalien-Cammer*," especially, p. 24. This work is therefore apparently the same as that of which Dr. Deichmüller has furnished me the title, but it seems to contain much additional information relative to this specimen. From the account here given and from all other available sources we learn that the specimen was found in 1753 by a man named Schober in a swamp near Lednice, a small village in the salt region, about three miles E. S. E. of Wieliczka, in Galicia, and therefore only about fifteen miles in nearly the same direction from Cracow. This swamp is said to lie 500 feet above the level of a small stream, tributary of the Weichsel, which flows through that country within a mile of the spot. It was not, however, supposed that this swamp was the original source of the cycad, as there are no rocks near there and the formation consists of simple clay soil. It was supposed therefore that it had been brought there by the peasants who were accustomed to utilize the swamp in macerating their hemp. But there was said to be some higher ground not far distant where there are hard rocks, and where, in fact, a small piece was found resembling the cycad in structure. If so this is probably the source of the latter.

A mining engineer named Borlach in some way obtained possession of the specimen and sent it to Dresden, where it was placed in the Natural History Cabinet which has developed into the present Museum of Geology and Mineralogy, occupying the southwest portion of the Zwinger. Borlach left manuscript notes with the specimen giving most of the above-mentioned details and also indulging in some speculations as to the nature and significance of the specimen, which are tolerably free from the crudities of most of the discussions of his time relative to this class of objects. He queries, for example, whether it is a marine plant, or the nest of some marine animal, or a petrified land plant such as the top of a palm tree. He seems to incline to the last of these suppositions, but says that if it really be a petrified palm the climate must have been hot at the time it grew, from which he infers that the earth must have changed its axis since that time. It is probable that Borlach is the person to whose opinion to this effect Eilenburg refers in the passage quoted above from his report.

Eilenburg describes the specimen in considerable detail, says that it is irregularly broken at both ends, has a cylindrical but somewhat oval shape, is 22 inches in major and 20 inches in minor diameter and 24 inches high, is of a black color, though brownish at one end, has the hardness of agate or flint, and takes a fine polish. If a small piece be detached and thrown into the fire it becomes ash gray and gives off the odor of brimstone, but remains firm and does not burst like other hard

stones. He describes the surface of the specimen as covered with holes somewhat systematically arranged, sometimes in groups having the shape and size of a walnut, except that in some cases there rises in the middle on the longer side a rounded boss [this must refer to the reproductive organs]. The areolæ are described as oval and penetrating two to three inches into the stone, diminishing in size with the depth. But in some, he says, there is a nucleus [leaf base] of the same material as the rock, except that it possesses small longitudinal pores. Besides the larger cavities there are other much smaller ones of the size of a pea arranged in elliptical concentric groups, some of which are compressed [bract scars]. In some places are to be seen special growths, so to speak, having the form of buds which have not yet opened and only slightly project. Some of these smaller cavities have porous nuclei resembling grains of barley, but most of them are empty. In one spot on this rare petrification, he adds, a piece of the rock has fallen out leaving a funnel-shaped depression two to three inches deep, the sharp end being directed toward the axis.

Eilenburg, as we have seen, adopted the view that the petrification represented a hippurite or coral, but at that day these objects were referred to the vegetable kingdom.

On page 150 of Walch's work it is stated that the specimen was found in 1751, but on the next page it is said in Borlach's notes that it was found "erst in diesem Jahre." As all accounts agree that it was sent to Dresden by Borlach in 1753, this would also seem to be the date of its discovery. It is, however, possible that Borlach wrote these notes two years earlier.

Dr. Deichmüller finds a note appended to the entry above quoted in Eilenburg's manuscript catalogue, which reads as follows: "We take pleasure in referring in this connection to the able work of P. Gabr. Rzaczyński: *Historia naturalis curiosa regni Poloniae*, 1721, printed at Sandomir, where on pages 5-117, is to be found a more complete account of the petrified wood (*Lithoxylis*) discovered in Poland." From this entry Dr. Deichmüller thinks it not impossible that this specimen may be treated in Rzaczyński's work as early as 1721. This does not seem probable from the above account, but it is greatly to be hoped that this work may be found and examined from this point of view.

The specimen lay in the Dresden Museum for nearly a century without receiving further attention. In 1844 Göppert seems to have already named and described it, for in his contribution to the second edition of Wimmer's *Flora von Schlesien*, vol. II, p. 217, where he describes the genus *Rau-meria* and names *R. Schulziana* (found near Gleiwitz in Silesia), he adds a note in which he says that "the celebrated

cycadean trunk at Dresden belongs to the same genus (*Rau-meria Reichenbachiana* Göpp. manuscript).” It was, however, nine years before the description and illustration appeared. Meantime Unger listed it in his *Synopsis Plantarum Fossilium*, 1845, p. 163, and in his *Chloris Protogæa* of about the same date, p. LXV. Göppert also put the name in his list contributed to Bronn’s *Handbuch* (vol. II, Abth. II, Th. III, *Index palaeontologicus*, 1848), both in the *Enumerator*, p. 38, and the *Nomenclator*, p. 1078, referring it to the lower “Molasse” or Miocene. The naked name occurred at least four times more, viz., in Unger’s *Genera et Species Plantarum Fossilium*, 1850, p. 301; in the same author’s work: *Die Pflanzenwelt der Jetztzeit in ihrer historischen Bedeutung*, 1851, p. 230; in Massalongo’s *Conspectus Floræ Tertiariæ Orbis Primævi*, 1852, p. 12; and in Giebel’s work: *Deutschlands Petrefacten*, 1852, p. 91; before Göppert’s descriptive paper: *Ueber die gegenwärtigen Verhältnisse der Paläontologie in Schlesien so wie über fossile Cycadeen*, in which the specimen was fully treated, finally appeared in the *Jubiläums-Denkschrift der schlesischen Gesellschaft für vaterländische Cultur*, Breslau, 1853, pp. 251–265, pl. vii–x.

In this paper we have a somewhat adequate description of the specimen accompanied by five figures (pl. viii, figs. 4–7; pl. ix), which, Göppert says, were furnished by Geinitz. He dedicates the species, however, to Reichenbach, long Director of the Dresden Museum, who, he says, had always afforded him free access to the collections. From this we must infer that he had studied the specimen himself at first hand. His historical account is very brief, referring chiefly to Walch’s description, but making no mention of Eilenburg’s.

He says that the trunk is cylindrical, 24 inches high, 20–22 inches in diameter, transformed into an entirely black, chert-like mass, showing very little structure. He classes it as the trunk of a cycad and compares it with that of *Cycas revoluta*, reproducing for comparison Vrolik’s figure of a somewhat remarkable specimen of that species (pl. x, fig. 3). He also compares, or rather, contrasts it with *Cycadeoidea microphylla* of Buckland, reproducing (pl. x, fig. 2) his figure in the *Bridge-water Treatise*, vol. II, pl. lxi, fig. 1. He recognizes the scars as those of the petioles, and says some are from one to two inches deep. The prominent reproductive organs could not, of course, have failed to attract his attention, and he refers to them as the small scars that take the place of the large ones and arrange themselves in circular or elliptical groups, which he regarded as perhaps representing spots where buds are breaking through. Such buds, he says, really seem to have been present here. He seems to have no idea of their being

reproductive organs, and compares them with those of both *Cycadeoidea microphylla* and *Cycas revoluta*, saying that as the buds grow out branches are formed.

The principal figure of the trunk (pl. viii, fig. 4), furnished, as he says by Geinitz, represents, about one-eighth natural size, the side opposite to that shown in the photograph sent me by Geinitz. The specimen here stands more erect, and though inverted shows less of the base. Fig. 5, which Göppert calls the "obere Querschnitt," is a view of the base, and the structureless area on the upper left portion represents a large oblique fracture, which I described as the loss of a "large piece extending to the medulla and running out 28^{cm} above, with a width of 43^{cm}." Plate ix represents natural size an area 20^{cm} wide and 215^{mm} high near the base, which is still at the top of the figure, showing several of the larger reproductive organs, one of which, though here drawn as if the spadix had fallen out, is of special interest in showing a radiate structure with carpel-like partitions that may contain seeds.

Plate viii, figs. 6 (natural size) and 7 (somewhat enlarged) represent a cross section of a small piece from this trunk, apparently a leaf scar containing the base of a petiole, which Göppert says was sent him by Reichenbach at an earlier date, and which he seems to have cut transversely and figured himself. He recognizes resin ducts and parenchymatous cells, but finds no vascular bundles. I was myself unable to see any vascular bundles in the leaf bases. They are either indistinguishable from the parenchyma or else they lie close to the walls and blend with the partition lines.

In 1858 Geinitz issued one of the reports on the Dresden Museum which bear the title: Das Königliche Mineralogische Museum in Dresden, in which he gave a succinct history of the Museum from its earliest beginnings. It does not, however, contain any of the above facts relative to this specimen, which is only once mentioned (p. 17), in connection with the great three days' fire of 1849, during which the greater part of the collections thus far accumulated were destroyed. "Only one specimen, the precious *Raumeria Reichenbachii* Göppert, a cycad from Wieliczka, remained unscathed under the protection of a sandstone pillar."

The next mention that I find of this species is in Miquel's Prodrômus Systematis Cycadearum, published at Utrecht and Amsterdam in 1861 (p. 29). It adds nothing to the knowledge of it.

Equally without significance is the allusion to it by Geinitz in his Dyas (Heft II, 1862, pp. 148, 341), except for his reference of it to the Permian, which was only a guess and of course a wrong one.

Carruthers in 1870 described the species twice in his well known paper on Cycadean Stems from the Secondary Rocks of Britain (Trans. Linn. Soc., vol. XXVI, pp. 682, 704), but does not appear to have seen the specimen. He says that the formation is unknown. Schimper also described the species in 1870 (Paléontologie Végétale, vol. II, p. 189), but he distinctly stated that he had not seen the fossil and could only copy Göppert's diagnosis.

Geinitz, in his report on the Dresden Museum bearing the same title as the one previously mentioned, but dated 1873, gives a short bibliography but, as it seems, inadvertently omits the title of Göppert's paper above treated, in which this specimen was first described. This omission he supplies by publishing a supplementary page dated January 12, 1874. This he was kind enough to send me at the same time as the photograph.

Count Solms-Laubach examined this trunk and was the first to point out that Göppert's whorls of small scars represent the lateral fruit-bearing axes (Einleitung in die Paläophytologie, Leipzig, 1887, p. 102). He did not therefore hesitate to class it as a *Bennettites* as Carruthers had defined that genus.

In 1892 Capellini and Solms-Laubach referred this species to Buckland's genus *Cycadeoidea* (*I tronchi di Bennettitee dei Musei Italiani*, Mem. Real. Accad. Sci. dell' Ist. di Bologna, Ser. V, Tom. II, p. 188), in which I have followed them in all my papers where I have had occasion to mention it (Proc. Biol. Soc. Washington, vol. IX, April 9, Washington, 1894, p. 85; Proc. U. S. Nat. Mus., vol. XXI, No. 1141, Washington, 1898, p. 198; Nineteenth Ann. Rep. U. S. Geol. Surv., 1897-98, Washington, 1899, pp. 601, 604, 605, pl. lix).

II. Geological Position.

It will be seen from the above sketch of the history of this specimen that the geological formation to which it belongs is only twice alluded to, one of the references placing it in the Miocene and the other in the Permian. That it could have come from neither of these formations I have all along been satisfied, and from its close resemblance to the trunks found in the Lower Cretaceous of other parts of Europe, and especially of America, I have believed that if its true source should ever be discovered it would be found to be in beds of that age. As it was found in territory now forming a part of the Austrian empire, and as geological activity in Austria has been very great for many years, I hoped to find that the region around Lednice had been surveyed in a manner sufficiently thorough to furnish the data for forming a judgment as to the true age of the beds in which it occurred. After some unsuccessful search among the voluminous reports of the Austrian Geological Survey, I

finally wrote to Dr. Emil Tietze, the distinguished Director of the k.k. geologische Reichsanstalt, to learn if possible whether this district had been surveyed and if so where I could find the report, maps, etc., He replied promptly and informed me that he had himself made this survey and published the results in 1887.*

In my letter to Director Tietze, dated November 12, 1903, I said:

"I note that most of the region about Cracow is mapped as Tertiary. It does not seem probable that the specimen could have come from the Tertiary, as all similar trunks, from whatever part of the world, have been found in much older strata, ranging from the Middle Jurassic to the Lower Cretaceous. The specimens most closely related to it in America occur in the Lower Cretaceous of the Black Hills, South Dakota."

In his reply of December 10, he says:

"The salt formation of Wieliczka is certainly Tertiary and Miocene. The *Cycadeoidea Reichenbachiana* surely does not come from this salt formation, the flora of which is in fact known from the works of Unger and Stur. But at Lednice the beds of the Miocene salt formation do not occur. There are developed partly Oligocene, partly Lower Cretaceous deposits. Probably, therefore, the specimen in question came from the Lower Cretaceous of Lednice. Still, I must admit that thus far the presence of fossil plants was not known here, and also that in the general region about Wieliczka such remains have heretofore scarcely been found. This is of course no reason for doubting their presence at this locality."

A glance at the fourth sheet of Dr. Tietze's Map (Jahrb. 1887, pl. xix), shows that beds colored for Neocomian occur at Lednice and throughout that general region, and it seems therefore next to certain that it was from these beds that the specimen was primarily derived.

III. Systematic Treatment.

Description of the Species.

Cycadeoidea Reichenbachiana (Göpp.) Cap. and Solms.

1755. Hippuriten oder versteinerte Corallenbecher Eilenburg : Kürzer Entwurf der Königlichen Naturalienkammer zu Dresden, p. 24.
1771. Vegetabilische Versteinerung Walch: Die Naturgeschichte der Versteinerungen zur Erläuterung der Knorr'schen Sammlung von Merkwürdigkeiten der Natur, Pt. III, p. 150 ; Atlas, Supplement, pl. IIIa, fig. 6.

* Die geognostischen Verhältnisse der Gegend von Krakau. Von Dr. Emil Tietze. Jahrb. d. k.k. Geol. Reichsanstalt, XXXVII. Bd., 1887, Wien, 1888, pp. 423-838. 4 maps.

1844. *Raumeria Reichenbachiana* Göppert in Wimmer: *Flora von Schlesien*, Ed. II, vol. II, p. 217 (nomen).
 1853. *Raumeria Reichenbachiana* Göpp.: *Jubiläums-Denkschrift d. Schles. Ges. f. vat. Cult.*, p. 262, pl. viii, figs. 4-7; pl. ix.
 1892. *Cycadeoidea Reichenbachiana* (Göpp.) Cap. and Solms: *Mem. Real. Accad. Sci. Ist. Bologna*, Ser. V, Tom. II, p. 188.
 1894. *Cycadeoidea Reichenbachiana* (Göpp.) Cap. and Solms. Ward: *Proc. Biol. Soc. Washington*, vol. IX, p. 85.
 1899. *Cycadeoidea Reichenbachiana* (Göpp.) Cap. and Solms. Ward: *Nineteenth Ann. Rep. U. S. Geol. Surv.*, 1897-98, pp. 601, 604, pl. lix.

Trunks large, cylindrical or subconical, little compressed, the longer diameter 54^{cm} at the base and 52^{cm} near the middle, the shorter 44^{cm} at the base and 42^{cm} near the middle, unbranched; rock very hard and chert-like, black, becoming light gray on long exposed surfaces, fine-grained, breaking with a conchoidal fracture, of high specific gravity; organs of the armor all slightly and uniformly ascending; phyllotaxy much interrupted and irregular but consisting of two spiral rows of which those from left to right form an angle of about 45°, and those from right to left of about 25° or 30° with the axis, the former much more clear; leaf scars subrhombic, the lower angle obtuse, the two upper sides commonly reduced to a curve or arch, somewhat uniform in size, averaging 25^{mm} in width (but showing extremes ranging from 15^{mm} to 30^{mm}) and 13^{mm} in height showing extremes from 10^{mm} to 20^{mm}; leaf bases usually visible at the bottom of deep areolæ, the depth varying from 2^{cm} to 6^{cm}, probably all disarticulated at a natural joint, the somewhat spongy or porous interior inclosed in a sheath of firm, fine grained material which itself consists of two plates, the two together about 0.5^{mm} thick; vascular bundles invisible, perhaps inclosed between the two plates of the sheath; walls very thick but varying from 2^{mm} to 15^{mm}, averaging about 1^{cm}, rough and irregularly grooved on the outer surface, sometimes showing a median line, often traversed by bract scars; reproductive organs very large, numerous and prominent, distorting the arrangement of the leaf scars, elliptical in cross section, the longer axis often 7^{cm} or 8^{cm}, the shorter 4^{cm} or 5^{cm}, but varying greatly in size and sometimes appearing to coalesce; involueral bract scars numerous and conspicuous, covering most of the surface of the trunk, spirally arranged around the spadices but straggling out over the surface of the walls, semilunar, triangular or subrhombic, rather small (3^{mm} to 6^{mm} long, 1^{mm} to 3^{mm} wide); central portion of the inflorescences often covered with scars or markings, sometimes solid and raised 1^{cm} to 2^{cm} above the general surface, a few concave and showing a radiate

carpellary structure suggesting the presence of contained seeds; armor very thick (5^{cm} to 10^{cm}), its attachment to the axis obscure and apparently indefinite; woody cylinder about 8^{cm} thick, uniform in color and texture and showing on the rough fractures no subdivisions or rings; medulla about 13^{cm} in diameter and nearly circular in cross section, hard, black, and homogeneous in structure, which differs little in appearance from that of the wood.

The only specimen of this species known is the one in the Dresden Museum of which the history is here recorded. It consists of the basal portion of a very large trunk of unknown height and of which the exact form of the upper part is also of course unknown, but from analogy with the hundreds of specimens of cycads which are now known from different parts of the world, it is tolerably safe to infer that the specimen represents at least half the length and that the top was conical or dome-shaped. The fracture through the middle portion is a little oblique so that the specimen leans somewhat. It is nearly even, but not wholly so, the central part of the piece preserved being somewhat higher than the part next to the surface so as to make it slightly arched or convex in the middle, sloping gently away from the center in all directions, the elevation amounting to about 4^{cm} or 5^{cm}. The specimen seems to have always been placed on this square end, apparently for no better reason than that it would thus stand without having to be blocked up, as would have been necessary if it stood on its much less even base. The base, as shown by the figures, is imperfect from the loss of numerous chips and splinters on one side and of the large piece on the other to which mention has already been made (supra, p. 46).

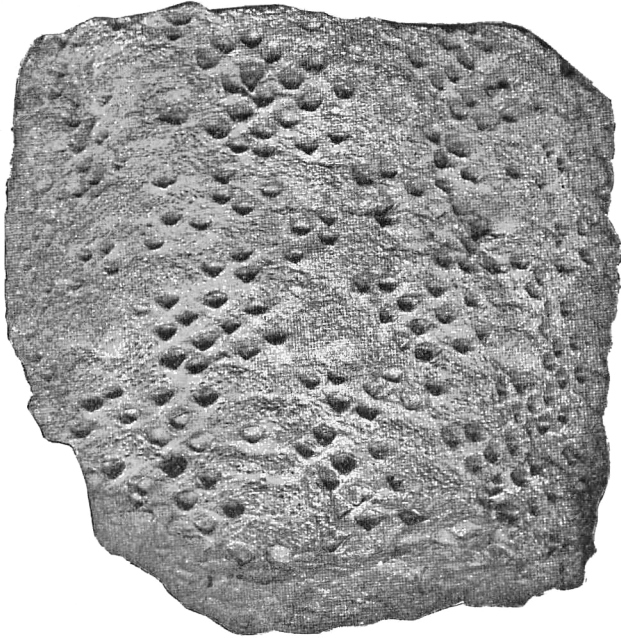
The specimen has not been weighed so far as known unless this was done soon after it was sent to Dresden, and if so the exact weight was not recorded, the only reference to the weight being that of Eilenburg who says that it is "über einen Centner schwer" (ibid, p. 24), which is repeated by Walch (op. cit., p. 150). This estimate was certainly much too small, whether we make the Centner 100, 112, or 120 pounds. The specific gravity is about the same as that of the type specimen of *C. Jenneyana* and it is somewhat larger than the basal piece of that specimen, which weighs 95.26 kilograms, or nearly 210 pounds.

Of all the species known to me *C. Jenneyana* is the one that *C. Reichenbachiana* most closely resembles, but as the above description clearly shows, it is certainly distinct from that species and is probably distinct from all other species thus far described.

After having taken full notes of the specimen, from which I have been able to make the above description, I drew the spe-

cial attention of Professor Deichmüller to the most promising of the reproductive organs, and at my indication he marked several of these with red chalk. Should any one ever undertake the study of its internal structure these should be specially investigated. Of course I cannot promise that they would be found to contain seeds, but if there are any that contain them the ones so marked are likely to do so.

It is unfortunate that Count Solms was unable to make this investigation when he was studying the British and Italian trunks. In a letter that I received from him dated October 28, 1894, he said :



Cycadeoidea Reichenbachiana (Göpp.) Cap. and Solms.
Dresden Mineralogical and Geological Museum.

“It is to be regretted that at the time I requested it and offered to pay the expenses of transportation and section cutting, permission to investigate the great *Raumeria Reichenbachiana* of the Dresden Museum was not granted me. Now that I am through with this work I would not expend the necessary three or four hundred marks. From the examination of a couple of small splinters broken from it I know, however, that the trunk presents well-preserved areas, and it contains a mass of inflorescences which are certainly wholly included. Geinitz has also sent me the photograph.”

It is greatly to be hoped that Count Solms may be induced to return to this subject and to investigate thoroughly the celebrated Dresden cycad from the standpoint of its internal structure and its botanical affinities.

As the specimen has thus far always been figured inverted, I have undertaken in the figure on the preceding page to show it standing on its base. But having nothing but the reproduction of the photograph sent me by Geinitz, all that can be done is to invert this and reproduce it again. I have already stated that as it stands on the support in the Dresden Museum it leans somewhat on account of the fracture being slightly oblique to the axis. This it is sought to remedy also, and the present figure shows it erect with the scars horizontal and their acute angle downwards, as it undoubtedly grew. As the light was from above in the photograph it is of course from below in this figure, but this mechanical defect is less pronounced than it would be in most cases.