has no doubt aided in the final production of these magnificent photographs of our satellite which have been produced by Mr. Warren De La Rue. This interesting subject has continued to claim much of the attention of the Oxford Professor of Geology, and several communications have been made by him to the British Association. We find him also communicating to the Royal Society, "Notes on the Drawing of 'Copernicus' presented to the Royal Society by P. A. Secchi" (1856); "Suggestions for the Attainment of a Systematic Representation of the Physical Aspect of the Moon" (1862); "On the Telescopic Appearance of the Planet Mars," and "On the Belt of Jupiter" (1863); "Notice of the Surface of the Sun," and "Notice of a Spot on the Sun observed at intervals during one Rotation" (1865). An interesting article on "The Planet Mars," from the same pen, appears in the "Quarterly Journal of Science," for July, 1865, in which he shows from his own researches, confirmed by the observations of others, that Mars is a planet "whose main characters of surface correspond to those of our earth, which has nearly the same density, nearly the same daily and nightly period, and is enveloped, like our earth, by an atmosphere partially loaded with scattered clouds, etc."

At Bath, in 1864, he was elected President of the British Association for 1865, and delivered the inaugural address before one of the largest assemblages of that body at Birmingham.

Meteorology is one of the subjects which has been carefully studied by Prof. Phillips, and its bearings on geological theory have been much employed in his treatises. Curious methods of measuring winds; registering the direction and inclination of a rain-drop; the variation in quantity of rain as we ascend above the earth's surface; an exact maximum thermometer, and a self-discharging electrophorus; are connected with the pleasant variations of study which have constituted his only valued amusements.

Amongst his more recent labours, we may point to the new Museum at Oxford, which has greatly profited by his experienced hand and well-trained method. By his amiable disposition and the simplicity of his character he has charmed all who have ever been brought within the sphere of his influence. Few men have won more friends. The scientific institutions of all parts of the world have sought to do him honour; and it must be in the highest degree gratifying to Professor Phillips to feel that they have been unsought, and are therefore the genuine recognitions of appreciated industry.

II.—ON THE PETRIFIED FOREST NEAR CAIRO.

By W. CARRUTHERS, F.L.S., F.G.S., etc.

(PLATE XIV.)

THE fossil wood which covers the desert to the east of Cairo has long filled the passing traveller on this great Eastern high road with surprise. The immense quantity of what seems to be decaying wood in a region described as a "dreary arid expanse, treeless and almost shrubless, rugged with dark-coloured knolls, and intersected

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by a few dry rain-channels," excites, by the remarkable contrast of the present with what is apparently the not far distant past, the wonder of the most careless observer. So vividly has this impressed the imagination of travellers that they have without hesitation correlated the fossil stems with the existing vegetation of Egypt. Burckhardt thought they were petrified date-trees, Mr. Holroyd referred them to the Doom-palm, and, to give an air of scientific accuracy to his determination, he adds the systematic name of the species (*Crucifera Thebaica*). Even the accurate "Murray," in his "Handbook for Travellers in Egypt," (1867) speaks of the specimens as palms, and a learned commentator, "A. C. S.," gets into raptures over the remarkable petrified palms which he found *in situ* (p. 156). I must add, however, that Gardiner Wilkinson, the author of the Handbook, refers to branched and thorn-bearing trees, as well as palms; and besides these, he says there are "some jointed stems resembling bamboos, one of which was about 15 feet long, broken at each of the knots. A small one given by me to the British Museum has rather the character of an *Equisetum*." This specimen is a cylindrical fragment of *Nicolia Egyptiaca* (Ung.), 18 inches long and 4 inches in diameter. It has several irregular transverse fissures, filled in with quartz, which has more successfully resisted the weathering than the body of the fossil; hence, the fissures stand out as ridges. A small, stout base of a branch projects for 2 inches from the middle of the specimen. So that this equisetaceous bamboo as well as the palms are really the same as the branched and thorn-bearing trees of Wilkinson—the *Nicolia Egyptiaca* of Unger. Newbold (Quart. Journ. Geol. Soc. vol. iv. p. 352) describes the fossils as resembling in external aspect the present palm of Egypt, but internally showing the wood arranged in annular concentric layers, as in exogenous stems. A few, he says, exhibited externally longitudinal fibres intersected at intervals from two to three feet asunder by transverse divisions, giving the trunk the appearance of a gigantic calamite, although the internal structure is that of dicotyledonous wood. He submitted his specimens to Robert Brown, who determined that they were dicotyledonous, but not Coniferous. The late Prof. Unger has published a valuable account of his investigation of the woods which he inspected in their native locality (Sitzungsberichte Math.-Naturw. Classe Akad. Vienna, vol. xxxiii. p. 209). He further examined a camel's load of specimens brought home by Kotschy, and determined that they all belonged to one species, to which he had already given the name *Nicolia Egyptiaca* (Endlicher's Genera Plantarum, Suppl. II. p. 102).

When Prof. Owen visited the "Fossil Forest," in the beginning of 1869, he collected a large series of specimens, which, on his return, he kindly placed in my hands for examination. I had a number of microscopic sections made, and had the satisfaction of determining the existence of a second species.

This extensive collection of silicified stems occurs in the Suez desert, about seven miles east by south from Cairo. Newbold says, "The area they cover is about four miles east and west, and three miles and a half north and south. Many of the trunks lie loosely

scattered over the surface amid rolled and angular fragments of dark grit, pebbles of chert, jasper, and quartz." They are of various lengths and size. The largest Unger saw were from 50 to 60 feet long. Similar measurements have been given by Newbold¹ and D'Hericourt.² The specimens are frequently deeply fissured transversely, suggesting, as we have seen, the notion of a jointed stem like a bamboo or calamite. The fissures sometimes pass right through, so as to break up a long stem into numerous fragments, a foot or two in length. Neither branches nor roots are found attached to the stems, nor has any trace of bark been detected. Externally they have a striated, fibrous appearance, as if they had been considerably decayed before being silicified. This external appearance, no doubt, suggested the idea of their being fossil *palms*, under which name fragments of them may be met with in almost any provincial museum. The scars of fallen branches are abundant, and always exhibit a considerable hollow at the place, as if the branch had rotted out. The fibrous surface of trunks that have been long exposed has a smooth and polished, almost varnished, appearance, produced by the action of the sand when driven against them by the wind. The wood is generally of a dark reddish-brown colour, and contrasts with the lighter-coloured barren and sandy soil on which it rests or is partially buried. This surface sand rests on a dark-coloured sand and pudding-stone, in which the silicified stems occur, and from which those lying loose on the surface have been washed. This stratum forms the dark-coloured knolls which protrude through the sand, and the stems are seen projecting from the weathered sides of these knolls. They lie horizontally in the sandstone. Newbold says a few have a vertical position, rising from 10 to 20 inches above the surface of the sand. Unger considers this bed to be contemporaneous with the Tertiary nummulitic limestones of Egypt. The forests which supplied the wood flourished, he believes, to the south, and the trunks were brought into the flat deserts by running water, which carried with it, also, the sand and mud in which they are now buried. The different density of the woods sorted them in the flood and influenced their transportation, and accounts for the limited number of species, and the remarkable predominance of one of them.

The wood is converted into chalcedony. The tissues are, on the whole, not well preserved, although occasionally specimens occur in which every cell and vessel is clearly defined. Unger detected in some specimens the branching mycelium of a parasitic fungus, penetrating the cavities of the large ducts, to which he gave the name of *Nyctomyces entoxylinus* (*Chloris Protogæa*, p. 8, tab. I. fig. 7). In none of the large series of microscopic preparations which I have examined (21 from the specimens collected by Prof. Owen, two from the Bryson Collection, and two from that of Robert Brown) have I been able to detect this fungus. In all of them the ducts are filled with transparent chalcedony, which occasionally shows a dark, amorphous and irregular, sometimes branching core, passing down the centre.

¹ Quart. Journ. Geol. Soc., vol. iv., p. 349.

² Bull. Soc. Geol. France, ser. 2, vol. iii., p. 541.

The chalcedony is more or less filled with minute bodies resembling transverse hexagonal prisms of quartz; but they are thin plates or cavities penetrating the chalcedony in every direction. They have an amorphous centre, and exhibit concentric lines of growth. They do not affect the light differently from the substance in which they are embedded, when examined by the polariscope. Newbold refers to a specimen shown him by M. Linant, at Cairo, which had apparently a somewhat similar structure, but it must have been on a much larger scale, as he does not speak of using any magnifying power in examining it. He says it "had the hollow lined with a white chalcedony-like siliceous substance, full of small cells resembling those of a honey-comb." (loc. cit. p. 353.)

The stems, as determined by Robert Brown, and confirmed by Unger, belong to Angiospermatus dicotyledons, and are made up of the tissues that enter into the composition of such plants. The wood consists of slender prosenchyma, abundantly penetrated by large ducts, which occur singly or arranged, two, three, or even more together. The walls of the ducts are marked with small, regularly arranged oval, or somewhat compressed hexagonal, reticulations. Transverse diaphragms break up the ducts in well preserved specimens into oblong compartments about twice as long as broad. The medullary rays are abundant, and form a considerable proportion of the stem. The concentric layers of wood are not so well defined as one generally finds them in dicotyledonous stems, because of the irregular manner in which the ducts occur throughout the year's growth. In this respect they resemble the walnut rather than the oak.

The histological characters of the stem have been hitherto but little used in systematic botany. A careful examination of numerous specimens, and systematic arrangement of the results, would, no doubt, throw much light on variations in stem-structure, associated with variations in the structures of different plants. But as this has not yet been done, I cannot go beyond R. Brown in saying that, while these stems are dicotyledonous, they are not coniferous.

The genus *Nicolia* was established by Unger in the second supplement to Endlicher's "Genera Plantarum," (p. 102), and was dedicated to William Nicol, who invented the process of slicing and mounting fossil woods for microscopic examination; and who thus supplied the palæontologist with the means of accurate investigation. It may in passing be mentioned in connection with Nicol, that his interesting collection of fossils is now deposited in the British Museum, having formed part of the extensive collection of Alexander Bryson, acquired some two years ago, after the death of that gentleman.

The two species may be thus described.—1. *Nicolia Egyptiaca* (Ung.), Endl. Gen. Pl. Suppl. ii. p. 102, and Sitzungs. Math. Natur. Cl. Akad. Vien. vol. xxxiii. p. 214, pl. 1, figs. 1 and 2, Plate XIV., Figs. 3 and 4. Wood cells in transverse section small, sub-quadrangular, about one-tenth of the diameter of the large ducts. Ducts roundish, singly, or two, three, and sometimes four, united

in linear series. Medullary rays in transverse section, elliptical, with the ends produced, composed in the centre of the ellipse of four cells in thickness, thinning out until the ends are composed of a single cell.

2. *Nicolia Owenii*, sp. nov., Plate XIV., Figs. 1 and 2. Wood cells in transverse section, large, oval, about one-fifth of the diameter of the large ducts. Ducts oval, singly, or two, or three, united in linear series. Medullary rays in transverse section, linear, doubly acuminate, composed of two cells in thickness at their greatest diameter.

EXPLANATION OF PLATE XIV.

Fig. 1. Transverse section of *Nicolia Owenii*, (Carr.) showing the large oval ducts, the large wood cells and the narrow medullary rays.

Fig. 2. The same in longitudinal tangential section.

Fig. 3. Transverse section of *Nicolia Egyptiaca*, (Ung.) showing the roundish ducts, small wood cells, and broad medullary rays. The narrow rays are cut through the slender termination of the ellipse.

Fig. 4. The same in longitudinal tangential section.

All the figures are drawn from specimens collected near Cairo by Prof. Owen.

III.—NOTES ON THE FEATURES OF DEVON, CORNWALL, AND GALWAY.

By G. H. KINAHAN, M.R.I.A., ETC.

DURING a brief visit in Devonshire, the main outlines of the features of the country appeared due to ice sculpture; nevertheless, the vast amount of denudation observable among the hills, evidently the result of meteoric abrasion, caused me to be cautious in coming to a conclusion too quickly, although Mr. G. W. Ormerod, F.G.S. (whose minute knowledge of the district is well known, and with whom I had the pleasure of examining a part of Devon), pointed out that in various places he had found glacier-formed drift. Having subsequently visited both Devon and Cornwall, although time did not permit of a minute search for ice-striæ, yet seemingly the first-formed impressions were correct, and, apparently, ice was the principal agent employed to carve out the main features of this portion of England.

Any observer who is acquainted with the country north of Galway Bay, Ireland, must be struck with the great similarity between the general outlines of that country and Cornwall, more especially the parts of the latter about the Land's End and the other granite tracts; both having long undulating hills, with banks of rocky or moraine drift in the valleys and hummocks of drift on the slopes leading from the gaps. Necessarily, both north of Galway Bay and in Cornwall, although dressed and planed rocks are numerous, yet ice etching is rare, as the nature of the rock favours its obliteration.

It may be asked, if the main features of Cornwall and Devon are due to one and the same agent, why the valleys among the hills formed of the so-called "Devonian rocks" should be so dissimilar to those in the granite and metamorphic rock country? To show that this is not unnatural, and that somewhat parallel conditions occur in the Co. Galway, is the object of these notes.