heads have a pistil in the center, and others are wholly staminate, is, that there is *greater axial vigor when the female flower is formed.* Whenever the common peduncle (below the scarlet involucre) is weak, a pistil never appears in that head of flowers. A few which seem strong neither have them, but the great majority of the strong peduncles are those which bear the female blossoms. Another interesting fact is that the number of male flowers is less in those heads which also bear a female, than in those which are wholly staminate. This seems to add to the point I made in my paper on *Ambrosia*, that after the flowers have been partially formed in embryo, and before the sex has been finally determined, the female flower, being primordially the strouger, has the power of absorbing the males or their partially formed elements into its system. It is certainly remarkable that in both these instances the number of male flowers should decrease in proportion to the existence or vigor of the central female one.

The male and female flowers of *Euphorbia fulgens* are formed much alike. The female occupies the center, and seems really but a prolongation of the main stem, on the top of which is an articulation from which the ovarium springs. The capsula readily falls from this articulation when mature. From the base of the female central pedunele spring weaker peduncles, colorless, appearing indeed almost like filaments, artieulated at about the same height as the female, only above the point bearing a short filament and anther—the caduceous part before referred to. No one can fail to see the correspondence of plan in these different parts, and I think that nothing but the favorable position in the direct line of axial vigor made the central flower a female one.

Cases occasionally occur in which a tolerably strong head of wholly male flowers will develop the central axis into a pedicel *almost as long and vigorous as those which bear female flowers.* But the flow of vital force—if I am correct in using this term—not being quite sufficient, the final goal of natural perfeetion in the female form was not reached. These eases do not occur often, but are well worth looking for, as they show so clearly the dividing line between the forces which goveru the male or female sex.

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## Note on the Relations of SYNOCLADIA, King, 1849, to the Proposed Genus SEPTOPORA, Prout, 1858.*

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Not having studied the *Polyzoa* of our rocks, it was only recently that we noticed the remarkable agreement between the fossil from the Chester division of the Lower Carboniferous, on which Dr. Prout proposed to found a genus *Septopora*, and the common Western Coal-measure species, that has been by some referred to the European Permian species, *Synocladia virgulacea*, the type of Prof. King's genus *Synocladia*. In identifying this fossil, from beds in Kansas referred by him to the lower Permian, with *S. virgulacea*, Prof. Swallow noticed that it differs from the foreign species in having only two, or, on some parts, apparently three,† rows of cellules to each of the longitudinal branches, instead of from three to five rows, as in the latter: and although he referred the Western species doubtfully to *S. virgulacea*, he proposed for it the provisioual name, *S. biserialis*, in case the differences noted should be considered of specific importance.‡ Prof. Geinitz, however, did not consider these differeuces of full specific value, and referred the species to *S. virgulacea.*§

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* Transac. Acad. Sci. St. Louis, Vol. I, p. 448, pl. 18, fig. 2, 2 a, b, c. 1858.

† It is only *immediately* below the bifurcations of the larger stems that the pores are so arranged that they might be counted so as to appear to make three rows, the proper number of rows being only two.

‡ Trans. Acad. St. Louis, Vol. I, p. 179, 1858.

§ Carbonf. und Dyas, in Nebraska, p. 70, 1866.

After a careful comparison of a series of good specimens, showing clearly both sides, of the fossil on which Dr. Prout proposed to found his genus *Septopora* (*S. Cestriensis*, Prout), from the original locality in the Chester limestone of the Lower Carboniferous, with an equally well preserved series of the Coal-measure fossil mentioned above, that has been referred to *S. virgulacea*, we find that they not only agree exactly in all *generic* characters, but that we have, up to this time, been entirely unable to discover any *specific* differences. We observe, it is true, among the Coal-measure specimens, some differences in the greater or less size, and irregularity of divergence of the branches, and consequent differences in the sizes and forms of the fenestrules; but the same differences are also observable among the specimens from the Chester beds, so that if we were to regard these as specific differences, we would have to admit several species to be common to the two horizons, instead of only one.

We have for a long time been aware of the fact that the form that has been referred to *S. virgulacea*, from the Kansas and Nebraska rocks, not only ranges through the beds included by some as lower Permian in Kansas, but that it has an extensive vertical and geographical range in the admitted Coal-measures of these States and Iowa. We are also now prepared to show that it not only ranges through the whole of the Coal-measures of Illinois, but that, as above stated, specimens beyond all doubt belonging to the same *genus*, and, as we believe, to the very same *species*, occur both in the St. Louis and Chester beds of the Lower Carboniferous limestone series. We were slow to adopt the conclusion that the specimens from these different horizons are really specifically identical, because we have so often, in such cases, on examining better collections than those first obtained, succeeded in finding differences not previously supposed to exist. In this instance, however, as well as occasionally in others, we have, as already mentioned, found the specimens to agree *exactly* in apparently all of their specific characters.

In regard to the generic relations of this fossil to the genus *Synocladia*, as typified by the common European Permian true *S. virgulacea*, there may be differences of opinion between some of those who draw very exact distinctions between genera, and others who give them greater latitude. That they really belong to the same genus, however, we can scarcely entertain any doubts, though it must be admitted that they are certainly distinguished on very nearly the same kind and degree of differences that distinguish *Fenestella* from *Polypora*.

It is a little remarkable that Dr. Prout, who made an especial study of the palæozoic *Polyzoa*, should have failed to notice the very close relations between his *Septopora* and *Synocladia*, at the same time that he assigned to the former almost exactly the same characters mentioned by Prof. King in describing his genus *Synocladia*. This identity of generic characters in these two species will be better understood by comparing the original generic descriptions of these forms as given by Prof. King and Dr. Prout, making, of course, some allowance for differences of terminology. Prof. King's description of *Synocladia* (see Brit. Permian Foss. p. 38) reads as follows:—

"A foliaceous or frondiferous infundibuliform *Fenestellidia*. Fronds consisting of numerous counecting stems or ribs. Stems bifurcating; radiating from a small root; running parallel to, and at short distances from each other, on one plane; and giving off bilaterally numerous short, simple branches [dissepiment], of which opposite pairs conjoin midway between its stems, arcuately or at an ascending angle. Branches occasionally modified into stems. Cellules on the inner or upper surface of the fronds; on both stems and branches; imbricated, and distributed in longitudinal series. Series of cellules separated from each other by a dividing ridge. (?)Gemmuliferous vesicles on the dividing ridge."

He farther adds that this genus differs from the allied genera, *in the arching and celluliferous character of its connecting branches, or dissepiments, and the fact that they are sometimes developed into intermediate radiating branches or stems.* It

will also be observed that he does not mention the *number* of rows of cellules or pores in each radial branch or stem, in his *generic* description, though he does so in describing the *species;* from which it is evident that he did not regard that as a generic character, and that he would have considered the American type as belonging to another species of the same genus.

For comparison with the above, we give below Dr. Prout's description of his proposed genus *Septopora*, from the Transactions of the Acad. Sci. of St. Louis, vol. I. p. 448 :—

"Bryozoum a fan-like expansion, with longitudinal ribs [stems of Prof. King], irregular in size, radiating from a centre, branching and occasionally anastomosing, having two lines of pores, one on each side of a tuberculated midrib.* Dissepiments forming arches or more or less angular, dividing the Bryozoum into quadrangular, round, semi-lunar, or rhombic fenestrules; each dissepiment supporting from one to four irregular lines of cell-pores; reverse smooth when worn, but more or less tubercled when perfect."†

He adds that, "though in its general features it resembles *Fenestella*, it differs in a marked degree by its celluliferous dissepiments." This, it will be observed, together with the *arched, or angulated character of its dissepiments, and the fact that they sometimes give origin to intermediate branches, or sterms*, as Prof. King terms them, were exactly the characters mentioned by the latter author as distinguishing *Synocladia* from other allied *Fenestellidæ*. Although Dr. Prout does not mention the character of the angulated dissepiments giving off intermediate branches, his figure 2 a, pl. 18, of the St. Louis transactions cited, distinctly shows it, and it is even more strongly defined in specimens now before us, from the original locality, and identified by Dr. Prout himself. It is also worthy of note, that Dr. Prout's enlarged figures, 2 *b* and 2 *c*, of the plate above cited, do not give a correct idea of this fossil, as may be seen by comparison with his own description. Figure 2 *c*, for instance, represents the fenestrules proportionally much too small, and the dissepiments too thick and not in the slightest degree "forming arches, or more or less angular." Figure 2 *b* also fails to show this arching or bending upward of the dissepiments, and the "tubercles" or vesicles on the midrib, which characters are as strongly defined in the Chester and Coal-measure specimens as in Prof. King's figures of the typical *S. virgulacea*. Some portions of the celluliferous surface near the base of the frond might be selected from some specimens that would nearly agree with these figures given by Dr. Prout, but this is far from the general character of the fossil farther up, where the branches are more diverging, so as to form larger fenestrules.

The question respecting the relations of these Western specimens, from the several horizons mentioned, to each other, and to the European Permian *Synocladia virgulacea*, is, for other reasons, one of more interest and importance than the mere difference or identity of particular fossils, since it involves the question of the duration in time, and the consequent geological range, of one of the most important of the types that have been appealed to as evidence that the Permian should be carried down in Kansas and Nebraska, so as to include several hundred feet of rocks regarded by us and others as belonging to the true Coal-measures. Whether we regard this fossil as being specifically identical with *Synocladia virgulacea* (which we do not admit), or view it as a distinct species of the same genus, it is now evident that it can no longer be regarded as properly a *Permian* type; for, even if it could be shown to be only a *variety* of *S. virgulacea*, it would still be a *form* unknown in the Permian of Europe; while here it is, as above shown, not only one of our most abundant Coal-measure types, but one that began its existence during the deposition of lower Carboniferous or Mountain limestone series.

* The midrib mentioned here is the "dividing ridge" of Prof. King, and the "tubercles" on it are the "(?)gemmuliferous vesicles" of Prof. King.

† It is minutely striated in perfect specimens, as we know from examination of typical examples from the original locality.

It is worthy of note in this connection, that there are various other fossils in the upper members of our lower Carboniferous series that might with quite as much propriety be referred to European Permian species as many of the Western Coal-measure types that have been so referred. For instance, Dr. Prout long since (Trans. St. Louis Acad. Sciences, vol. I. p. 450) identified a *Polypora*, from the Chester beds, with the Russian Permian *P. biarmica;* while several other species of *Polyzoa* found in the Chester group are scarcely distinguishable from forms found in western beds that have been by some included in the Permian. We also now know that there are species of *Schizodus*, *Pleurophorus*, etc., in the Chester beds *very* like Permian forms; while a Crinoid, found by Prof. Marcou in beds in Nebraska (referred by him to the Permian), and thought by him to be "extremely near *Encrinus moniliformis*, Miller, of the Muschelkalk of Europe," is now known to range through the whole of the Western Coal-measures, and to be represented in the Chester limestone beneath the Millstone-grit by closely allied species. Indeed, a number of Crinoids that have been recently discovered in the Chester beds and the Coal-measures of Illinois are remarkably similar representative forms. Even the curious *Zeacrinus mucrospinus* of McChesney, from the Upper Coal-measures of Illinois, has its nearly allied representative in the Chester limestone below the Millstone-grit.

Numerous facts like the foregoing (such, for instance, as the occurrence of Tertiary types of plants in the Nebraska Cretaceous), might be cited to show that in many instances particular forms of life, both animal and vegetable, appeared here at earlier periods than in the old world. Hence, great caution, and some general knowledge of the entire fauna and flora of our rocks, are often required in order to arrive at sound conclusion with regard to their relations to particular horizons of the series, as made out in Europe.

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*April 5th.*

DR. CARSON, Vice-President, in the Chair.

Twenty-three members present.

PROFESSOR LEIDY made the following remarks ON DISCOSAURUS AND ITS ALLIES.

The body of the last vertebra in the series of caudals belonging to the Kansas saurian, described by Prof. Cope under the name of *Elasmosaurus*, has the length less than the depth or breadth, which latter is the greatest diameter. It is moderately contracted towards the middle, the sides below the neural arch and the surface below the costal articulations being fore and aft concave, and bounded in front and behind by an acute margin from the articular ends. A ridge extends fore and aft between the chevron articulations and the included surface is concave, and exhibits a single lateral venous foramen. The costal articular processes project from the middle of the side of the body, reaching nearer the fore than the back end of the latter. They are transversely oval, about three-fourths the length of the body, and the height about half. They form a deep concavity, with acute margins expanding peripherally. The articular ends of the body are transversely oval and defined from the intermediate portion of the latter by an acute everted margin. A short distance within the position of the latter the surface is marked by a narrow groove, and within the circle of this groove the surface projects in such a manner as to appear like a distinct disk or epiphysial plate applied to and coössified with the body. The surface of the disk is convex at the periphery and moderately concave towards the centre. The articular surface beyond the groove defining the disk appears as an everted ledge, and the triangular articular facets for the chevrons appear as deflections of the ledge. The extension of the latter inferiorly is greater at the posterior extremity of the body than