Zoology Part XXXII: Report on the CRINOIDEA. First Part.-Stalked Crinoids. By P. H. Carpenter. Bound in Volume 11,1884.

American Jura-Trias (Jura only ?), which was first discovered by Meek and Hayden.[1] It was subsequently found in Utah by Wheeler's Survey, and owing to the constancy of its characters, even in examples collected at widely separate localities, it has been relied on with considerable confidence in the identification of Jurassic strata. According to Meek and Hayden there are five large, oval, petaloid areas, bounded on either side by "rather narrow, slightly elevated, transversely crenulated margins,"[2] and the figure which was published later by White[3] clearly shows that the affinities of this species are with *Extracrinus* rather than with *Pentacrinus*, of which it has been hitherto regarded as the only species yet recognised in the American Jurassic rocks. Hayden's Survey found it in 1877 extending through a considerable thickness of Jurassic limestones in Idaho and Wyoming.[4] The supposed Triassic beds of Dun Glen and the Pah Ute range contain a slightly larger form of joint, which differs from the Jurassic specimens. It was found associated with what are regarded as unmistakable Triassic fossils and also a *Spirifera*. Mr. Emmons[5] speaks of it as follows:—"It should be stated also that these disks of *Pentacrinus* found in the Dun Glen limestone vary somewhat from the type specimens, and are all of larger size, reaching one-fourth of an inch in diameter, while those of Jurassic age scarcely reach one-fifth of an inch. Prof. Whitfield suggests that the Dun Glen variety may possibly be a new species."

Elsewhere, too, it is stated by Hall and Whitfield[6] that this Triassic form from Dun Glen differs from the Jurassic specimens "in the more obtuse points of the star, and the filling up of the angles between the points, and also in the broader form of the elliptical figures on the articulating surfaces of the disks." These are just the differences between the stem-joints of *Extracrinus* and those of *Pentacrinus*, as explained above; and I am therefore disposed to think that this Triassic type with broader petals may be a true *Pentacrinus*, more especially as we have no knowledge of any European *Extracrinus* below the Lias.

It must be remembered that nearly all of these identifications are based upon the characters of the stem-fragments only, the calyx and arm-bases being but rarely preserved. Every one who has examined moderately long pieces of stem, whether recent or fossil, has noted the variation of characters which they present in different parts; and there has therefore been a general disposition not to place too much reliance on species of which only the stems are known. I have been surprised to find, however, in the case of

[1] Palæontology of the Upper Missouri, Invertebrates, part i. p. 67, pl. iii. fig. 2.

[2] *Proc. Acad. Nat. Sci. Philad.*, March 1858, p. 49.

[3] Report upon Geographical and Geological Explorations and Surveys west of the One Hundredth Meridian, in charge of First Lieut. Geo. M. Wheeler, vol. iv. part i., Palæontology, p. 162, pl. xiii. fig. 6,*a*.

[4] Eleventh Annual Report of the U. S. Geological and Geographical Survey of the Territories, embracing Idaho and Wyoming, 1879, pp. 626, 627.

[5] Report of the Fortieth Parallel Survey, Descriptive Geology, vol. ii. p. 711.

[6] *Ibid.*, vol. iv. p. 280, pl. vi. fig. 16.

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