

level. (5) The deposition of the Cambrian "Tonto sandstone" (which, however, did not cover all of the Proterozoic monadnock), succeeded by the accumulation of the "Tonto shale," "Red Wall limestone" and later Paleozoic formations.

It is clear that the present vertical distance between the pre-Tonto and pre-Unkar unconformities affords only a minimum measure of the throw of the pre-Cambrian faults. That there has been some slight post-Paleozoic movement along the Bright Angel fault, enough to fissure the "Red Wall" and "Aubrey" formations, is shown by the erosion of the Bright Angel gorge, the alcove of Indian Garden, and the shallow drainage trench followed by the Grand Canyon Railroad near the southern rim of the canyon. As may be seen from the Bright Angel topographic sheet of the U. S. Geological Survey, the three features mentioned together constitute a remarkable rectilinear depression at least 20 miles in length. F. L. RANSOME

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AN EARLY FIGURE OF THE KING-CRAB (*LIMULUS POLYPHEMUS*)

THERE has recently been placed on exhibition in the gallery of arthropoda in the Zoological department of the British Museum a copy of a water-color drawing made about 1585 and containing what is believed to be the earliest representation of the American king-crab (*Limulus*, or *Xiphosura*, *polyphemus*). As the subject is one of special interest to American naturalists, it may be worth while to place on record here some of the facts relating to it.

The original drawing was made by John White, who was one of the first settlers in, and for some time governor of, Virginia, and acted as lieutenant to Sir Walter Raleigh on several voyages to North America. Three volumes of drawings by him are preserved in the Department of Prints and Drawings in the British Museum, and have recently been described in detail by Mr. Laurence Binyon in the fourth volume of his "Catalogue of Drawings by British Artists . . . in the

British Museum" (1907, pp. 326-337). Many of White's delineations of natural objects are of great beauty and show a fidelity to nature which was very rare at the period when they were executed.

The drawing in which the figures of the king-crab are introduced is a view of Indians spearing fish, and two specimens of *Limulus* are roughly but quite unmistakably sketched among shells and other marine objects lying on the beach in the foreground. Like many of White's drawings this one was engraved for de Bry's "America" in 1590. In the engraving the figures of the king-crabs, like some other portions of the picture, are drawn in somewhat greater detail, suggesting that the engraver was working from some other drawing now lost. As Mr. Binyon suggests, "doubtless White made many repetitions of drawings which would have such lively interest for his countrymen." In de Bry's volume the text accompanying these drawings is a translation of Thomas Harriot's "A Brief and True Report of the New Found Land of Virginia, &c.," first published in 1588 and afterwards reprinted in Hakluyt's "The Principal Navigations, &c." in 1598 (the following quotation is from the Hakluyt Society's edition, 1904, Vol. VIII., p. 370). In his list of the natural products of Virginia Harriot mentions "Seekanauk, a kinde of crusty shel-fish, which is good meat, about a foot in bredth, having a crusty taile many legges like a crab, and her eyes in her backe. They are found in shallowes of waters and sometime on the shore." This doubtless refers to the king-crab. It would be interesting to know whether any readers of SCIENCE can give a reference to any earlier mention of this animal.

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A PLAN FOR INCREASING THE EFFICIENCY OF MARINE EXPEDITIONS

APART from their work in deep-sea sounding, and in the accumulation of meteorolog-

¹ Grands Voyages, Part I., pl. 13.