An Old Shoreline. By D. W. Dennis.

The Elkhorn is a small tributary to the Whitewater River from the east, some four miles south of Richmond, Ind. There is in this stream a falls some twenty feet in height that has receded and left a gorge of about that depth for a distance of a half mile or more; this gorge is cut through strata of the same age as those through which the Niagara gorge passes. At the Elkhorn the surface rock is the Niagara limestone; it is massive and some twelve feet thick; it is underlaid by the uppermost layers of the Lower Silurian formation, consisting of alternating layers of thin flagstones and clay. This clay and fragile flags wear faster than the overlying massive rock, and so it shelves over; one can pass behind and around the falls just as he can parts of the Niagara Falls. The fossils in the Lower Silurian strata are the same one finds in the gorge at Richmond. In the uppermost stratum, however, they are beach-worn, ground in many instances to unrecognizable fragments; a half dozen species can, however, be made out—enough to settle the question of its age without dispute; it is Lower Silurian; it is an ancient coquina rock; it crops out for a distance of half a mile; tons of it can be examined; its story is as interesting as it is unmistakable; here was the beach of the Cincinnati Silurian Island; the wearing of the stones has not been in recent geological times, for they are restratified and are overlaid by the Niagara rock, which bears glacial striæ on its surface. After these rocks were beach-worn, the sea deepened, the shore line moved eastward and remained there long enough for the twelve feet of Niagara rock to form in a clear—clayless—sea.

Two Cases of Variation of Species with Horizon. By D. W. Dennis.

The east fork of the Whitewater River has worn a gorge in the upper strata of the Lower Silurian limestone, near Richmond, Ind. This gorge is about 75 feet deep, is terminated by a falls a half mile above the city, and for a distance of some two miles below the falls the river bluffs are generally precipitous. This Lower Silurian formation consists of flagstones four inches or less in thickness, alternating with clay strata of about the same thickness. The flags are made up chiefly of the shells

of brachiopods, and these are in many places numerous in the accompanying clay strata; from these clay strata the shells weather out perfectly. This note concerns itself with two species of these brachiopods—Orthis biforata and Orthis occidentalis. The first of these has its hinge line sometimes greatly prolonged, as in Fig. (1). Every gradation in this respect is to be found as shown in Figs. (2), (3), (4) and (5). Specimens like Fig. (1) are to be found in the uppermost strata, and those with the hinge line less and less prolonged are found in lower and lower strata until finally in the lowest strata those without any prolongation—Fig. (5)—are to be found. The matter of interest is that the development of the hinge line went forward during the entire time of the formation of these rocks; its development is roughly in proportion to the altitude.

Forms like Figs. 4 and 5 continued to survive and are found at all horizons, but forms like Fig. 1 are not to be found at the lower horizons.

A similar change is to be noticed in Orthis occidentalis. Typical specimens of this species found at a low horizon have a channel along the middle line from the umbo to the anterior margin; see Fig. 6. But as one searches in higher and higher strata he finds the channel dying out and a ridge taking its place, until in the highest strata the typical species is displaced by its variety, Orthis sinuata, Fig. 7.

Notes on the Distribution of the Knobstone Group in Indiana.

By J. F. Newsom and J. A. Price.

[Abstract.]

The series of shales and sandstones in Indiana known as the "Knobstone" has been grouped to itself principally because of its lithological characters. Because of its stratigraphical position with regard to the Lower Carboniferous limestones it has been regarded, in part at least, as the equivalent of the Kinderhook group of Illinois.

On Gorby's geological map of Indiana, of 1893, the Knobstone area is represented as extending as far northward as Honey Creek Township, in White County.

Field work done by the Indiana University Geological Survey in 1897 shows that the area underlain by the Knobstone does not extend so far north of Putnam County as has been hitherto suspected. It also seems