A CASE OF STREAM PIRACY NEAR GREENCASTLE, INDIANA.

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In the course of topographic mapping by the class in General Geology, DePauw University, in the fall of 1922, the following case of piracy was noted and studied by the students mapping this area. I desire to express my appreciation to Miss Helen I. Tucker and Mr. Robert L. Allen of the class in Field Geology, 1923, for their careful topographic map of the area. This area deserves attention, not be-

Fig. 1. The approximate drainage relations before piracy began.

cause of the magnitude of the phenomenon involved, but as an evidence of the general presence of important geological phenomena, even in areas which seem very bare of certain phases of geologic interest.

As noted in text books of Geology, conditions are ripe for piracy, where two adjacent drainage systems or parts of the same drainage system have unequal opportunities in the struggle for existence. Any factor which gives one stream the advantage over another stream is thus a contributing cause to piracy. Such factors may be: steeper gradient, greater rainfall, less resistant rock, etc. A complete study of any case of piracy should involve not only a statement of the physiographical history of the piracy, but also the points of superiority of the one drainage system over the over. In the present case, the physiographical history is so plainly written by the hand of nature,

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that he who is geologically trained may read with ease. The reason for the superiority of the one stream over the other is not so indubitable.

In the NW. ¼, SW. ¼, Sec. 15, Tp. 14 N., R 4 W., on the Arnold farm, there is a stream flowing in a general northerly direction, dividing into an east and west fork at the north fence of the Arnold farm. The east fork is an intermittent stream; the west fork is fed, in its main branch, by a limestone spring which flows throughout the year. In figure 3, this branch is shown as a permanent stream and so it would be, but for the swallowing of the water in its lower course by the numerous limestone joints. At the spring, the limestone is not covered by as great a thickness of glacial till as farther down stream. It is therefore

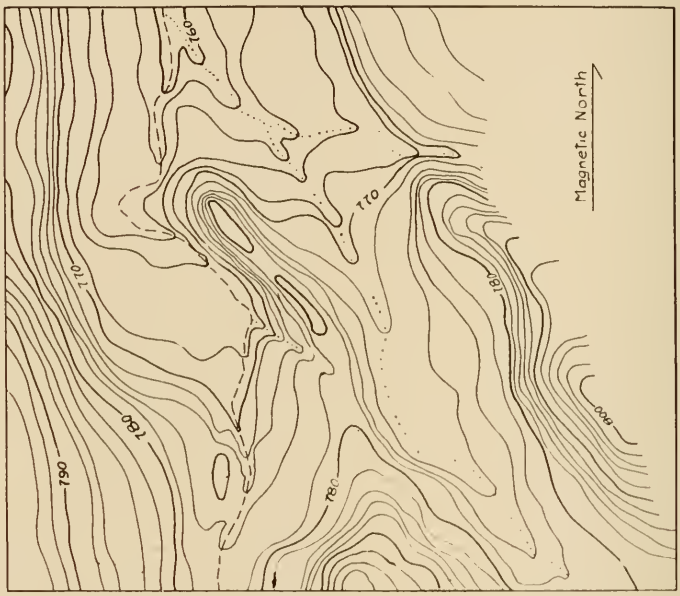

Fig. 2. An intermediate stage between that shown in figures 1 and 3 in the drainage relations.

believed that in the earlier history of the west fork it was a true permanent stream due to the spring and that the water did not then lose itself in the joints, where its flow would give the west fork the advantage over the east fork. Therefore a branch of the west fork would have an advantage over a branch of the east fork.

Shortly above the junction of east and west forks, between the forks, rises an elongate oval hill about 20 feet above the level of the west branch. This hill is entirely surrounded by valleys. It is composed of boulder clay and, except for its marked oval form, is of the Indian-mound type. Immediately to the south of the hill, an intermittent branch joins the main west fork on the east. Up stream, this branch runs first in a general east-west direction, then when well beyond

the oval hill, the course swings around toward the south. From this bend, toward the north, east of the hill is a broad valley running down to the main east fork, but without a stream in it. This streamless valley serves to isolate the oval hill from the main valley wall on the east as does the east branch of the west fork from the valley wall on the south.

In figures 1, 2 and 3, the attempt is made to illustrate what is believed to be the drainage development of this hill and the surrounding

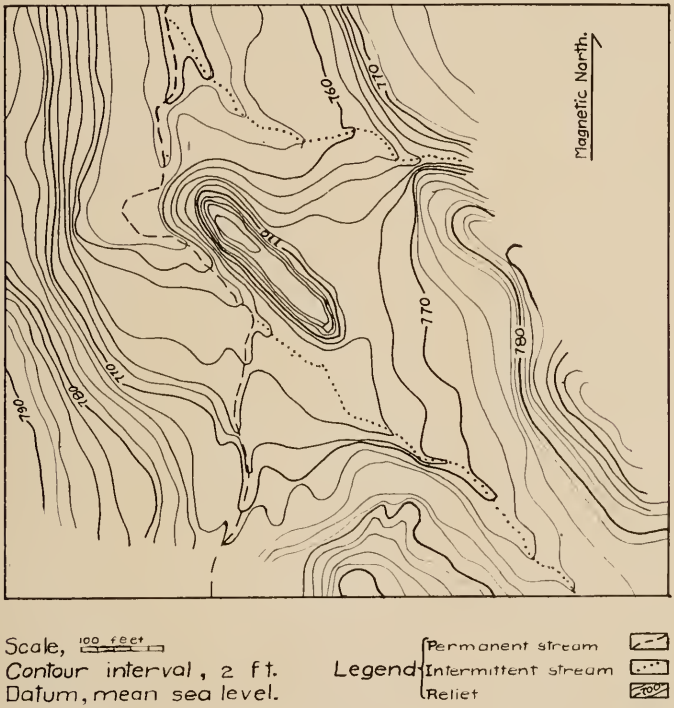

Fig. 3. Present drainage showing the progress of piracy as begun and illustrated in figure 2.

valleys. Figure 1 shows the approximate drainage relations before the piracy began. The west fork has not bifurcated; a branch runs down to the east of the oval-shaped hill (now only a point running out from the south wall), joining the east fork. Figure 2 tells substantially the same story, except that there is a gully cutting off from the west fork which in time will behead the branch of the east fork. Figure 3 shows present drainage relations, the gully having completely separated the hill from the south wall and beheaded the other branch.