the story of the attack must have been transferred from one Santa Fé to the other, but how and in which direction?

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A CHANGE OF NAMES

ON June 29, 1933, in the *American Museum Novitates* No. 638, I gave a preliminary description of an ancestral crocodile, naming it *Archaeosuchus richardsoni,* establishing the family Archaeosuchidae.

It has been called to my attention that *Archaeosuchus* is preoccupied (*Archaeosuchus cairncrossi,* Broom, R. 1905), and I take this occasion to rename this important Triassic reptile *Protosuchus richardsoni,* changing the family name to Protosuchidae.

BARNUM BROWN

DECEMBER 19, 1933

REPORTS

TRI-STATE GEOLOGICAL FIELD CONFERENCE OF THE UPPER MISSISSIPPI VALLEY

FIFTY-TWO geologists from the universities of Chicago, Illinois, Iowa and Wisconsin, Northwestern University, the State Geological Survey of Illinois and the Northern and Western Illinois State Teachers Colleges met at LaSalle, Illinois, on October 28 to organize the Tri-State Geological Field Conference of the Upper Mississippi Valley and participate in its first annual field trip. The tri-state conference is an outgrowth of a series of annual field trips that have been sponsored for some years past by the Illinois Geological Survey. As a result of suggestions made by Professor W. H. Twenhofel, of the University of Wisconsin, Dr. M. M. Leighton, chief of the Illinois State Geological Survey, issued special invitations to the geologists of Iowa and Wisconsin with the view of enlarging the scope of the field conferences and creating an opportunity for discussing and correlating current geological investigations that have common interest to the geologists of Illinois, Iowa and Wisconsin.

The two-day field trip was conducted by M. M. Leighton (glaciology), J. M. Weller (Pennsylvanian stratigraphy), H. B. Willman (physiography) and L. E. Workman (pre-Pennsylvanian stratigraphy) of the Illinois Geological Survey staff in the upper Illinois Valley between Starved Rock and the big bend. The Illinois Survey has recently completed a restudy of the geology along the Illinois River in preparation of a report on the geological resources adjacent to the new Illinois Waterway. This investigation in the Upper Illinois Valley was carried on by H. B. Willman.

Exposed near LaSalle are thick Pleistocene deposits, including tills, outwash and loess of various ages, 500 feet of Pennsylvanian beds, representing more than 12 cycles of deposition, and the Galena, St. Peter and Shakopee formations of the Ordovician system. In addition, 2,000 feet of older unexposed beds are known from well borings. The predominant structural feature in this part of Illinois is the LaSalle anticline, dipping steeply to the west and gently to the east. Folding occurred along this axis in pre-Pennsylvanian time as well as more recently and the Pennsylvanian beds overlie Middle Ordovician sediments with an angular unconformity which is the most important in the state.

On the morning of the 28th the conference proceeded eastward from LaSalle, and observed the LaSalle limestone rising sharply upon the west flank of the LaSalle anticline. This limestone is the thickest Pennsylvanian limestone in Illinois and near LaSalle furnishes the raw material for three large Portland cement plants. After reaching the crest of the anticline the route of the party extended for several miles upon an upland bedrock surface that was swept by the Kankakee torrent in the Carey substage of Wisconsin age. The preexisting valley was inadequate to accommodate the large volume of water derived at this time from the rapidly melting Lake Michigan and Saginaw glacial lobes, the glacial Kankakee River overflowed, and previously deposited glacial materials were swept from the bedrock surface. East of LaSalle this surface is formed by the Galena dolomite, St. Peter sandstone and Shakopee dolomite. It is rendered uneven by scoured undrained depressions and gravel bars and is an example of scab-land topography on a small scale mantled by soil. Near Utica the Shakopee dolomite has been used in the manufacture of hydraulic cement, and some of the old abandoned mine entrances were seen in the north bluff of the Illinois, where this variable formation is well exposed on the crest of the LaSalle anticline.

At Utica the conference turned southward, crossed the Illinois River and proceeded to Starved Rock State Park for luncheon. Starved Rock is a precipitously sided remnant of St. Peter sandstone, rising more than 100 feet above the flood plain of the Illinois, that was separated from the south valley wall by the Kankakee torrent. From its top, which is less than an acre in extent, a magnificent view of the Illinois valley may be obtained.

The afternoon was devoted to the study of four Pennsylvanian sections in the bluffs of the deeply

intrenched Vermilion River between Streator and Oglesby. In northern Illinois the Pennsylvanian cyclothems[1] are not normally developed. Here marine deposition predominated more than in any other part of Illinois, and the non-marine sandstones, that elsewhere are the basal members of most cyclothems, are thin or absent with the single exception of the Vermilionville sandstone, which locally attains a thickness of 100 feet or more. Four coals have been mined in this district, Nos. 2, 6, 7 and another, the Streator coal, which occurs between the horizons of Nos. 5 and 6. Coals Nos. 2 and 7 are persistent uniform beds. Coal No. 6 is missing throughout wide areas, but here and there it occurs in lenticular bodies a few miles in extent and achieves a maximum thickness of 8½ feet. The Streator coal is abnormal in that it occurs in the midst of a sandstone succession, does not have an underclay and is not overlain by marine beds. At some places it is very shaly and impure, and this seam, which occurs in irregular lenticular pockets, may be an example of a transported coal. Coals No. 4, the Harrisburg "No. 5" coal of southern Illinois, and No. 5, the Springfield coal, are entirely absent from the LaSalle area, although their horizons are plainly shown by underclays directly succeeded by marine strata.

The first section visited is at the southeastern extremity of the Marquette Cement Company's quarry on the north side of Vermilion River. Here is an excellent exposure of the LaSalle limestone and the next overlying cyclothem, which consists of a thin discontinuous basal sandstone, an underclay, a thin coal and overlying marine shales and limestones. Near Lowell one of the finest cut-bank sections in Illinois was seen rising nearly 100 feet above the river, extending from Coal No. 2 to the Vermilionville sandstone and including the barren horizons of Coals Nos. 4 and 5. A short distance to the east the river flows on dipping beds of Galena dolomite. The interval between this formation and Coal No. 2 is occupied by a thick complex underclay succession, which, in western Illinois, expands and is divisible into 12 cyclothems. Near Lowell this underclay furnishes material for the manufacture of high-grade face brick. At Klein Bridge a section was examined extending from the marine beds above Coal No. 6 to the base of the Vermilionville sandstone, including the horizon of the Streator coal that is here represented by black canneloid shale. A lenticular mass of gray shale locally intervenes between Coal No. 6 and its black roof shale, causing the latter to rise abruptly above the coal. At Bailey Falls the Vermilion River flows through a narrow gorge cut beneath the resistant LaSalle limestone, that rises steeply to the east on the flank of the anticline. Nearly 70 feet above the present river level a pot-hole 10 feet deep and 2½ feet in diameter, that was probably formed by the flood waters of the Kankakee torrent before the modern gorge was eroded, is preserved in the limestone.

[1] Strata deposited during a single cycle of deposition.

At an evening meeting short talks were given by L. E. Workman, on the subsurface geology of the LaSalle area; A. H. Bell, on magnetometer investigations along the LaSalle anticline; J. M. Weller, on Pennsylvanian sedimentation in northern Illinois; and H. B. Willman, on the Pleistocene history of the Upper Illinois Valley. After discussions of various geologic problems suggested by these talks the Tri-State Field Conference of the Upper Mississippi Valley was organized. Selected to serve as an executive committee were M. M. Leighton, Illinois Geological Survey, A. C. Trowbridge, University of Iowa, and W. H. Twenhofel, University of Wisconsin. It was decided that the 1934 conference should be held in Wisconsin under the direction of Professor Twenhofel, who will serve as chairman of the executive committee for the next meeting.

On the morning of the 29th the party proceeded eastward to Split Rock, where strongly dipping St. Peter sandstone is overlain by Lower Pennsylvanian beds that dip only about half as steeply. The route was then retraced to LaSalle and thence the conference continued west to Spring Valley, where a large gravel pit shows excellent sections of a gravel delta nearly 60 feet thick that was deposited in a preexisting tributary of the Illinois River flooded by backwater from glacial Lake Illinois. This delta is believed to have been mainly formed during two seasons of melting, when the glacial front stood only a very short distance to the east. The occurrence of this and other similar deltas proves that the upper Illinois valley, with some of its major tributaries, was in existence before Wisconsin time. There is, however, no evidence indicating that this part of the valley antedates the Illinoian glacial invasion, and it is therefore believed that the upper Illinois valley originated after the retreat of the Illinoian ice sheet. The narrow upper Illinois valley is in strong contrast to the wide valley below the big bend which marks the course of the pre-glacial Mississippi River.

The next locality studied west of Hicks Corners shows an excellent section extending from the LaSalle limestone downward through the subjacent cyclothem and including the upper beds of the next lower cyclothem. Except for the thin coal below the LaSalle limestone and the underclays in this and the lower cyclothem, the section consists exclusively of marine beds. The LaSalle limestone here is much more argillaceous and impure than it is only a few miles farther to the east.

Significant Pleistocene sections were seen in a highway cut west of Depue and in cut banks on East

Bureau Creek 5 miles to the northwest. The first section shows Tazewell loess above Bloomington drift. The profile of weathering of the loess extends only slightly into the underlying drift. The other sections consist, in descending order, of Wisconsin till, Iowan loess, late Sangamon loess, Illinoian gumbotil and Illinoian drift. The Iowan loess is entirely unweathered, but the late Sangamon loess is leached throughout. Peat occurs in the lower part of the Iowan loess and in the Sangamon loess. Outside the borders of the Wisconsin drift sheet the Tazewell and Iowan loesses combine to form the so-called Peorian loess of western Illinois and Iowa. These phenomena emphasize the intimate relationships of the Iowan and Wisconsin drifts and have resulted in the recent reclassifications of the Pleistocene, in which the Iowan and Wisconsin drifts and associated deposits are combined with the Recent to form the Eldoran series.

At noon the conference adjourned.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

A NEW METHOD OF ILLUSTRATION

CLEAR and carefully chosen illustrations make for speed and ease of comprehension and thereby increase the value of geological articles. With the foregoing aim in view, the writer used the following method of illustrating a thesis dealing with joints in sedimentary rocks.

The field work was done in the Black River Valley region of New York State, where the thin bedding of the Ordovician strata and the close spacing of the approximately vertical joints made possible the collection of "joint blocks"—rock specimens, two of whose sides are normally bedding plane surfaces and the other sides joint plane surfaces. Care was exercised to obtain blocks with joint plane directions which represented the dominant strikes of the area from which they were taken. As each block was collected, the directions of the joint planes bounding it were carefully ascertained with a Brunton pocket transit and recorded on the block. The writer used a colored pencil for noting the directions, and it worked well on the smooth bedding plane surfaces. For rough surfaces, adhesive tape marked with ink would no doubt prove a better method.

In the laboratory, each joint block was brushed free of dust and loose particles and a six-inch white celluloid scale attached to the face by means of rubber cement. The specimen was then set up against a black background and photographed with a Vogtlander camera.

The use of the black background prevented halation and made possible a longer exposure to bring out details. Also, a black background, which on the negative would be light, made it possible to use opaque for printing and orienting the block on the negative.

The negatives were first coated with retouching fluid. Opaque, which is thick and must be thinned to proper consistency, for pen use, was then applied. The direction of each joint plane was printed parallel to the strike of the plane. A north-south arrow was drawn in the correct direction, after which the negative was squared with reference to the arrow. The negatives were printed in the usual manner, using No. 3 Velox paper.

In the resulting pictures, the strike relationships of the various joint sets were clearly evident. It is the opinion of the writer that a better presentation and conception of the facts was attained in this way, than if the directions of the joint strikes had been merely diagrammed.

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A SIMPLE METHOD FOR MEASURING SMALL TIME INTERVALS

IN many physiological laboratories it is inexpedient to supply each student with an electrically maintained tuning fork to measure small time intervals in nerve and muscle experiments. A dependable and simple arrangement has been in use here for some time where an accurate record of fractions of a second is required. The only conditions necessary are that the laboratory should be supplied with A.C. current from the mains, and the frequency of the current should be known.

The materials needed are a small signal magnet with a light flexible steel vibrator, a lamp socket, a 50 or 60 watt lamp, a push button or switch and a plug. The adjusting screw is removed from the signal magnet so that the vibrator is suspended free above the electromagnet. The coil of the magnet is connected in series with a lamp (as resistance) and a switch, and the circuit is completed by connecting across the mains. When the current is switched on, the vibrator is drawn towards the magnet and vibrates above it at double the frequency of the alternations in the mains. If the pointer of the signal is allowed to record lightly on a revolving kymograph drum, it will draw a series of waves of sufficient amplitude to serve as a time record. The peaks of the waves correspond to the alternate positive and negative surges