strongly. Any matter which does not commend itself readily at the first presentation should be laid aside promptly, that no member be allowed to express himself in such manner that his *amour propre* would be wounded in case the vote should go against him. All of the matters referred will be considered carefully by the committee as well as by a great part of the membership during the next three years, and there will be little difference of opinion respecting important matters at the Congress of 1900.

The reading of memoirs was somewhat perfunctory, or rather the listening was so. The feeling seemed to be that these would be printed and that members would have opportunity to digest them at leisure. Several reports were presented by committees, and they will be published in the volume of proceedings. A committee was appointed to consider the principles of chronological classification of sediments and another to consider the propriety of establishing an international journal of petrography. The Congress expressed itself as earnestly favoring the establishment of a permanent floating institute to carry on work such as that of the Challenger expedition, and also as favoring the developing of geological courses for higher classes in lycees and gymnasia. The members were called upon to urge these matters upon their governments.

The Congress adjourned on September 5th, to meet in Paris in 1900.

The real value of this as of previous Congresses is not to be measured by the list of memoirs or by the records of discussions. Important as those may be, they are of vastly less importance than the actual contact of men coming from all parts of the world. Geologists from Asia, the Pacific islands, the Americas and almost all nations of Europe met together; too often known to each other previously only as streaks of printers' ink, they became actual entities; those devoted to similar studies found opportunity to compare observations; many, whose conceptions of phenomena were limited by the little area of their country, have gone home with a broader knowledge; and a long step has been taken toward binding together our men of geology. The true work of the Congress was done not so much in the sessions as in the huge lobby, wisely provided, where those of like minds were gathered in little clusters making liberal dividends of knowledge. This feature was recognized as all important by the Committee of Organization, which, with this in view, planned the excursions on which so much of the real work was done.

To speak of individual members of the Committee of Organization as especially worthy of remembrance may seem ungracious when all were so untiring, but one cannot refrain from acknowledging the indebtedness which all must feel to Karpinsky, Tschernychew, Nikitin, Chrustchoff and Michalski, while the Americans will remember pleasantly the courtesies rendered by Mr. Gardiner, the only American student in the University of St. Petersburg.

JOHN J. STEVENSON.

NEW YORK UNIVERSITY.

A NEW INVESTIGATION OF MAN'S ANTIQUITY AT TRENTON.

I.

A RENEWED search for evidence of glacial man at Trenton induced Professors G. F. Wright and Arthur Hollick, Messrs. H. B Kümmel and G. N. Knapp, of the New Jersey Geological Survey, and myself, on June 25, 26, 27 and 28, 1897, to explore a site on the summit of the glacial gravel terrace at Trenton, where Mr. Ernest Volk*

* Working under the direction of Professor F. W. Putnam for the New York Museum of Natural History, Mr. Ernest Volk was generally present at the

has alleged the discovery of artificial argillite flakes, and other relics of human handiwork, in a yellow sand of supposed glacial age under a surface loam stratum indicating Indian occupancy.

Five trenches (Trench A, 21½ ft. by 3¾ ft. by 3 ft. 3 in. deep; B, 7¾ ft. by 4½ ft. by 3 ft. 3 in. deep; C, 6 ft. by 6 ft. by 2 ft. 8 in. deep; D, 4½ ft. by 4½ ft. by 3 ft. 3 in. deep), sunk over an area 90 ft. long by 33 ft. broad,* well upon the flat summit of the terrace, with Trench D, about 80 ft. from the outer brink, revealed clearly:

Layer 1.

(10 inches to one foot).

A discolored surface loam, disturbed by recent cultivation, mixed with the remains of the Indian and white man. It contained:

	Specimens.
Blocked-out blades, Argillite	3
Blocked-out blades, Chert	2
Argillite blade, long, narrow (spear form)	1
Arrow-head, broken, Jasper	2
Arrow-head, broken, Chert	1
Hammer stone, pebble, fragment	1
Animal bones, with large scapula, probably Elk splintered limb bones and limb bone of a bird	22
Mussel shell (Unio) fragments	6
Pebbles, probably fire-cracked	131
Teshoa or pebble flake, scraper?	1
Argillite flakes, probably artificial, generally with green patina	19
Chert flakes, probably artificial	11
Jasper flakes, probably artificial	5
Stone (unidentified) flakes, probably artificial	6
Quartz and Quartzite fragments	5
Potsherds, Indian (8 found together)	9
Pebbles unworked; size, from that of robin's egg to goose egg; largest 4 in. in diameter	55
Miscellaneous stones, mostly pebble fragments	103
Oyster shell	1
Cinder fragment	1
Anthracite coal fragments	2
Glazed potsherds	2
Brick fragment	1

digging and hospitably offered us every assistance, being seconded by the kindness of the owners of the property, the Misses Lalor, who generously placed their land at our disposal. Dr. Charles C. Abbott was continually present, and Dr. Harrison Allen, of the Academy of Natural Sciences, of Philadelphia, visited the Trenches on Sunday, June 27th.

* Kindly reserved for our use by the Misses Lalor, owners of the property, for whose generous hospitality we herewith return our thanks.

Below layer 1, and as the chief center of observation and interest, rested

Layer 2.

(18 inches to 2 feet).

Composed of a fine yellow sand, streaked towards its lower portion with fine irregular films of reddish sandy clay which thickened and coalesced at the bottom into a distinct harder red band.

Advancing slowly into layer 2 with trowels against the sides of the trenches where the stratification had been exposed in vertical section, we pulled out one by one the pebbles, broken stones and artificial chips, etc., described below, giving special attention to the large pebbles and the chips most artificial in appearance, calling the attention of all our colleagues to each large object, when it first clinked against the trowel's edge so that its depth could be measured and its position with reference to the clay films, observed by us all before its removal.

The objects thus found (after discarding those resting in the upper part of the layer for about four inches below the bottom of layer 1 as pertaining to what we called the zone of doubt) were as follows:

ARTIFICIAL FLAKES.

Note.—The numbers in inches after the specimens indicate the depth in Layer 2 below the zone of doubt, the letters the trench referred to.

	Number of Specimens.
Jasper, 10 in.	1
Jasper, 12 in.	1
Quartz, 4 in	1
Argillite green patina, 6½ in	1
Sandstone or Argillite, 2½ in	1
Argillite lying flat, 3¾ in	1

Argillite, 7 in 1
Jasper, 12 in 1
1⅜ in. wide, ⅛ in. thick, Trench A 2 in. resting on its side below a thin film of reddish clay. The film waved from one side of the trench to the other over the specimen, becoming slightly thinner and fainter directly above it, though without showing signs of break. Photographed in place, 20 in. See Figs. 1 and 3 1
Argillite green patina, about 1 in. in diameter, possibly artificial, resting exactly in line of clay film, 12 in 1
Quartzite, possibly artificial, 8 in . . . 2
Chert (resting indubitably in films of sandy clay. Trench B. Photographed in place, signed G. F. Wright, Arthur Hollick, H. C. Mercer). See Figs. 2 and 3 (in Dr. Hollick's paper), 12 in. 1
Flakes Argillite, small below clay film, Trench B., 14 in 1
Quartz, Trench B., 8 in 2
Quartzite pebble, 10 in 1
Argillite, possibly artificial C., 12 in . . 1
Quartzite, possibly artificial C., 10 in . . 1
Jasper, possibly artificial C., 6 in . . . 1
Argillite, possibly artificial C., very small piece, 2½ in 1
Chert from pebble, 6 in 1
Argillite, possibly artificial, 3 in. long by 1¾ wide, green patina under a very distinct film of reddish sandy clay, Trench C., 19 in 1
Argillite, possibly artificial, exactly in line of heavy red film and 6 in. below fainter film C., 16 in 1
Quartz, possibly D., 6 in 1
Chert from pebble, 6 in 1
Argillite, probably artificial, bedded in filmings of reddish sandy clay not immediately overlaid by a continuous film, but rather by faint reddish broken streaks D, 15 in 1
Argillite patinated, 2¾ in. long, 1½ in. wide, 1⅛ in. thick, probably artificial, resting in series of clay films less clearly marked than in the other trenches, but nevertheless extending over the specimen in a series of blotches, D, 16 in . 1
Argillite piece, possibly artificial, on film, 15 in 1
Argillite piece, possibly artificial, on C, 12 in 1

Total 30

ANTHRACITE COAL.

Small fragment size of hazlenut, below zone of doubt, in yellow sand 1
Anthracite coal, small piece size of hazlenut, C, 3½ in 1

Total 2

ROOTS.

In all the trenches, various sizes from fine rootlets to size of middle finger, various depths.

PEBBLE USED.

Battered on end, 6 in 1

Total 1

FIG. 1.—View of face of Trench A, showing Argillite specimen (see middle right-hand specimen in Fig. 3, Professor Hollick's paper) resting in place, 20 inches down, in the yellow sand at base of the rule. The trowel scratch marks the position of the film of stratification just above the specimen. The lower scratches mark the thickening of these films at the base of the yellow sand. From surface to trowel, Layer 1 (Indian), ten inches to one foot. From trowel to series of scratches, Layer 2, yellow sand, relic bearing, eighteen inches to two feet. Below scratches coarse sand and gravel, non-relic bearing. Specimen photographed in place June 26, 1897, by Ernest Volk, in presence of G. F. Wright, H. B. Kümmel, C. C. Abbott and H. C. Mercer.

PEBBLES, UNUSED.

Depth, 9 in	1
Largest, size of pigeon egg; smallest, size of pea (various depths)	75
2 in. below red film, under which chipped Argillite was found lying flat, 16 in	1
Large pebble resting directly upon clay film, 17 in., 8½ in. long, 4¾ in. wide at widest, 2½ in. thick	1
Flat, 16 in	1
Large in Trench A, 15 in	1
1½ in. in diameter, 4 in. under film	1
18 in	1
Under film, 16 in	1
Unused, large in film, 16 in	1
Small, 16 in	2
Small, 16 in	3
Most of the pebbles saved from 1 in. to 2 in. in diameter.	
Large, about 4 in. in diameter, broken, showing on one side, according to Mr. Kümmel, facets of wind erosion, in film, 14 in.	1
Weathered, 2¾ in. long, 2 in. wide, 1½ in. thick, resting below a distinct film and above another, 17 in.	1
2¼ in. long on film, 16 in.	1
3 in. in diameter, Trench D, 6 in. on film	1
1 in. in diameter on film, 18 in	1
On film, 18 in	1
Size of large Chestnut on film, 20 in	1
Smaller below film, 14 in	1
Hazlenut size, 14 in	1
Unused, 3½ in. long, 2½ in. wide, ⅜ in. thick	1
Various depths	27
Various depths, Trench B	64
Various depths, Trench C	26
Lower part of stratum, various depths.	16
2 in. long, 1¼ in. wide, near three smaller pebbles	6
2 in. below red film, 16 in.	1
(Large, 7½ in. long, 5½ in. broad, 3 in. at thickest, broken, upper side roughened but not certainly wind-worn, C, 16 in.)	1
D, various depths	13
Total	254

PEBBLES FRACTURED.

2 in.	1
4 in.	1
9 in.	1
Small fragment, Trench B, 9 in.	1
Small piece, probably broken by fire, 5 in.	1
In connection with black streak extending down from surface,	2
Small piece, 2 in.	1
Total	8

MISCELLANEOUS STONES. PROBABLY NOT ARTIFICIAL.

Flat Sandstone fragment, 18 in	1
Jasper (?) fragment, 10 in	1
Quartzite (?) fragment, 18 in	1
Argillite (?), 13 in	1
Unidentified piece, 6 in	1
Flat stone, possibly chip, 12 in	1
Argillite piece, vertical position, 6 in	1
Argillite piece, 7 in	1
Quartz piece, flat, 4 in	1
Argillite piece, flat, 1½ in	1
Sandstone fragment, 4 in	1
Shale piece, 2½ in	1
Quartz fragment, 2½ in	1
Red Shale fragment close under faint red clay film, 18 in	4
Argillite chip, possibly artificial, 12 in	1
Shale fragment, 3 in. diameter, 18 in	1
Argillite fragment, Trench C., 10 in	1
Quartz, depth not marked	1
Quartzite fragment, 6 in	1
Argillite fragment, 6½ in	1
Total	23

ANT GALLERIES.

About size of string-bean pod, not so long, 1 in. below irregular filmings, penetrating film by narrow hole, size of timothy grass, D, 16 in.	1
Size of lima bean, under clay film, just above which is another similar gallery, containing eggs, Trench D, 22 in.	1
½ in. horizontal diameter, ¼ in. vertical, 1½ in. below middle film, followed inward and lost without tracing upward through film, Trench B, 11 in	1
Total	3

CONCLUSION.

Fifty stone flakes mostly man-made, not of argillite alone, as we had been led to expect, but of argillite, chert, jasper and quartz, one battered pebble and two fragments of anthracite coal, thus positively

found in the much discussed stratum of yellow sand which we have called Layer 2, present us with interesting evidence as to the relation of the sand stratum to man; while in the further presence of twenty-three miscellaneous stones, and two hundred and fifty-four water rolled pebbles, ranging in magnitude from the size of a chestnut to that of an ostrich egg, we are confronted with interesting considerations as to the deposition of the sand, whether by wind or water.

The antiquity of man, at the site, judged by these observations, depends on three questions:

1. *Are the significant chips in the yellow sand artificial?* To which my experience answers yes.

2. *Are they in situ in the yellow sand?* To this I would say that the notion of the intrusion of objects from the Indian surface layer above (Layer 1), down and into the sand below (Layer 2), is suggested to me for the following reasons: Because the deepest artificial specimen in the yellow sand (Layer 2), rested not over three feet below the surface; because the range of stone chips (argillite, jasper and quartz) and fractured pebbles was identical in the yellow sand (Layer 2), and the Indian Layer (Layer 1), and showed thickest under the latter, growing thinner downward; because argillite chips identical in character and equally decomposed and patenated occurred in both layers; because two pieces of anthracite coal were found in the upper part of the sand (Layer 2), and, lastly, because the artefacts were scattered at irregular depths in the sand (Layer 2), nowhere suggesting by their collocation a floor of occupancy or workshop abandoned by primitive man.

On the other hand, neither the shallow depths of the objects nor the closeness of the layers exceeded conditions known to archæology where divergent culture epochs had been found to rest closely one upon another. And while no potsherd or bone was found below (in Layer 2), the similarity of the stones used where the blade material (ingredient to glacial gravel) had continually remained the same failed to overweigh the probability of antiquity as to the specimens from the lower layer. Coal fragments not uncommon in the alluvium of the Delaware, whose trough traverses coal beds near Mauch Chunk, had been found by me in an underplaced Indian village layer, probably pre-Columbian, at Upper Black's Eddy,* while the observed position of roots and the study of small ant galleries failed reasonably to account for the site of the chips in Layer 2, whose position in several cases beneath well observed and unbroken films of stratification remained the most important fact in the evidence.

When all was considered I was forced to conclude that a significant number of artificial chips rested in situ in the sand, and hence were of an age antedating its deposition.

Here again, as at the underplaced layer at Lower Black's Eddy, we were confronted by two thin strata of human occupancy, resting one upon the other, but separated from each other by an interval of time as yet unmeasured.

Antedating the familiar Indian, preceding the birth of the known riparian forest as indicated by the superficial blackness of its plant-stained loam, the immediately underplaced yellow sand Layer 2, close beneath the surface as it lay, testified to the previous presence of a chipper of argillite, jasper and chert, and a bruiser of pebbles, upon the surface of the bluff. As before remarked, the bones of animals and pottery, characteristic of the upper layer, were ab-

* See researches upon the antiquity of man in the Delaware Valley and the eastern United States. Publication of the University of Pennsylvania, Vol. VI., p. 78. Ginn & Co., Boston. 1897.

sent in the lower; otherwise, no marked difference appeared in the kind of stones used, their patina, or mode of fracture.

From the evidence previously produced by the more notable explorations of the Trenton site, the present testimony differs in several particulars. The shallow zone of discovery, ceasing at about three feet below the surface, failed to encroach upon the region (10, 20 and 30 feet deep in the immediately underplaced gravel) alleged as the horizon of previously excavated human relics. No series of ovate blades resembling the drift specimens of France and England appeared as in previous years, to out-classify all other objects; while the contention (unreasonably over-valued in our opinion) in favor of the absence of jasper in earlier human horizons was not sustained by our discoveries. Nevertheless the existence of man upon the bluff top under topographical conditions differing from those of the present had to to be admitted.

This granted, however, the question of human antiquity at the site depended not so much upon the evident priority of the sand relics to the Indian remains of the surface loam as upon the length of time of such priority—namely, upon the final space question:

3. *What was the age of the sand?* Extending outside the province of my qualification, this question remained to be settled by my colleagues. Let their special experience decide whether this yellow layer resting exactly upon the Trenton gravels is a true part of their composition. Was this overlying sand the work of the river swollen to excessive volume by the melting of the great glacier? Had modern rivulets, since drained away, spread it upon the terrace top? Or, during the time before trees grew and loam formed, had wind whirled it, pebbles, clay films and all, upon the even table of the bluff?

Henry C. Mercer.

II

On June 25th, by invitation of Professor G. Frederick Wright, the following party met at Trenton, N. J., to make excavations in the Trenton gravel terrace, and to examine any archæological material which might be brought to light: G. Frederick Wright, Oberlin, Ohio; H. C. Mercer, Doylestown, Pa.; C. C. Abbot, Trenton, N. J.; Ernest Volk, Trenton, N. J.; Arthur Hollick, Staten Island, N. Y., and a workman to perform the rough digging.

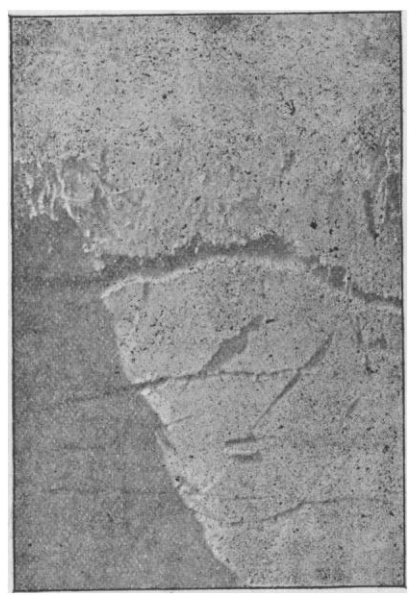

Fig. 2. Artificial chert specimen (see also upper right-hand specimen, Fig. 3, on next page) photographed as found in place in the yellow sand. The trowel scratches show the line of films of stratification above and below the object. The dark, deep scratch marks bottom of Layer 1 (Indian), 10 inches to 1 foot. Yellow sand, Layer 2, extends downward from heavy trowel streaks. Photographed by Mr. Volk in the presence of Professor Wright, Dr. Hollick and Mr. Mercer.

Through the kindness of the Misses Lalor, a part of their farm, favorably located on the edge of the terrace, had been reserved for investigation. Upon the surface of this part an area about forty feet long in a north

and south direction, by about four feet wide, was selected by our party for excavation. Our workman first removed the surface soil by spading and shoveling, to a depth of about six inches, and threw it to one side. This soil was found to consist of a fine yellow-brown sand, mixed with humus and other carbonaceous matter, which gave it a prevailingly dark color. All objects thrown out with this soil were collected and listed under 'A' and 'B;' the first representing the preliminary spading, the second the shoveling.

The objects consisted of fire-cracked stones; unworked pebbles, from size of a cobble to that of a robin's egg; chips and flakes, mostly of chert, but a few of argillite; rejects; imperfect implements; a fragment of anthracite coal; a cinder; a piece of oyster (?) shell; a piece of modern pottery; unclassified stones, mostly broken or chipped. The entire collection apparently represented the ordinary refuse of an Indian camping ground, with a few indications of modern civilization.

At the southern end of the area from which the surface soil had been removed, a pit was excavated 4 ft. by 4 ft. by 3½ feet deep. The sides of this pit were carefully squared and showed the following section:

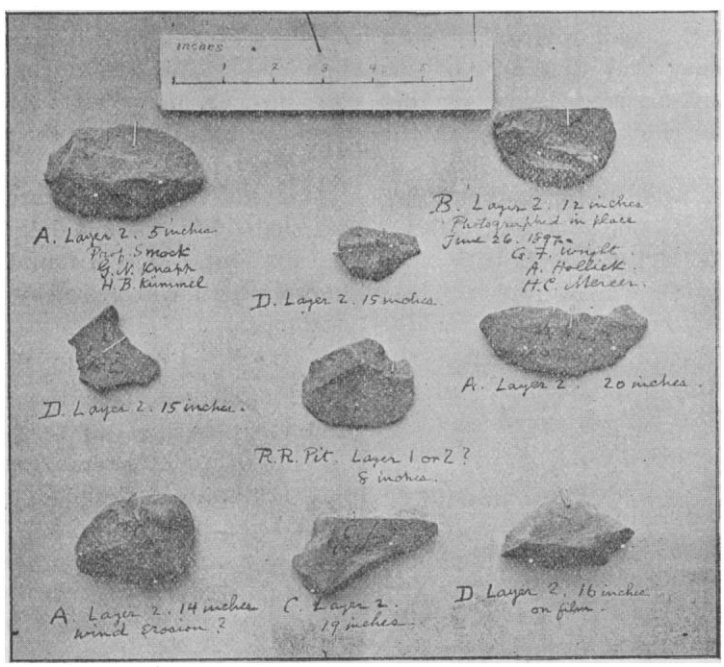

FIG. 3.—Weathered pebble, artificial flake of chert and flakes of argillite, described in the text, except one on the upper left-hand corner, found at significant depths in the yellow sand, sometimes upon or under filmings of stratification, by Professor Wright and Dr. Hollick, Professor Smock, Messrs. H. B. Kummel, G. N. Knapp and H. C. Mercer.

1. Disturbed surface soil, consisting of fine yellowish-brown sand and black carbonaceous matter, giving it a prevailingly dark color, 8–12 in.

2. Undisturbed fine yellowish sand, irregularly stratified, with streaks of red sandy clay carrying small pebbles, 2 ft. 6 in.

3. Floor of red sandy clay at bottom.

The line of demarkation between the disturbed surface soil and the undisturbed

sand could not be sharply drawn. Streaks and small pockets of black soil often extended down irregularly into what was apparently undisturbed sand. A zone was therefore recognized, below the disturbed surface soil, which we agreed to call the 'zone of doubt.' All implements or objects found in this zone were listed under 'C.' The bottom of the 'zone of doubt' was about 18 in. below the surface of the ground.

Below the bottom of the 'zone of doubt' we agreed that the sand was undisturbed by human agency and that any objects found there must be regarded as having been deposited at the same time with the sand, or possibly intruded from above, in which case some evidence or indication of such intrusion should be apparent.

The following method of investigation was then pursued:

One person entered the pit and gradually cut away the face with a trowel. As soon as any object was struck the rest of the party were notified and the sand around it was carefully removed. The distance from the bottom of the 'zone of doubt' to the object was measured and the object was then removed and examined. Each such object was immediately wrapped in a separate piece of paper, together with a memorandum of the facts in connection with it.

NOTES.

As far down as we dug we found roots of living trees, larva of June bugs (?), ants, and occasional disconnected spots or streaks of dark matter, which I took to be the remains of old decayed roots.

The undisturbed sand was found to be distinctly stratified and evidently a water deposit. Pebbles and gravel grains were not uncommon, especially in connection with the clay seams, and nearly all the chips and implements found were lying flat, although a few were more or less on edge.

Nothing but rough chipped implements (palæoliths?) and fragments were found below the 'zone of doubt' up to the time when I left (4 p. m., Saturday, June 26th), when about one-half of the main excavation had been made.

Supplementary pits were also started close to the main excavation in order that others of the party might be occupied in digging at the same time. The methods employed were identical in each case.

We failed to verify the contention that only argillite chips and implements are to be found in the undisturbed sand. Some jasper, chert and quartz flakes were also found, but argillite was the most abundant material represented.

One fine chert implement was photographed in place. The details in regard to this and other objects found in the undisturbed sand are described by other members of the party.

CONCLUSIONS.

The writer accepts the conclusions of competent authorities that the so-called palæoliths are of human manufacture and that the sand in which they occur is of glacial age.

After a careful examination there seems to be no doubt that this sand is a water deposit and that it had not been disturbed by human agency prior to the time when it was excavated by our party.

The only controversy which seems possible is over the question of intrusion from above and, in view of the facts now adduced, the burden of proof should in fairness rest with those who hold this view.

ARTHUR HOLLICK.

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*DIVERSITY OF LANGUAGES.**

THAT type of civilization cannot be regarded as ideal or forethoughtful which

* Concluding section of the address on 'Improvident Civilization' by the Vice-President of Section I., Social and Economic Science, American Association for the Advancement of Science, Detroit, 1897.