29. DISCOVERY OF MAMMALIAN REMAINS *in the* OLD RIVER-GRAVELS
of the DERWENT near DERBY. (Read April 29th, 1896.)

PART I.—By H. H. ARNOLD-BEMROSE, Esq., M.A., F.G.S.

THESE remains were discovered under the yard of the Crown Inn at Allenton, not quite 3 miles south of Derby. In March, 1895, Messrs. Offiler & Co. were sinking a well there for drinking-water. When it was partly bricked in, a strong unpleasant smell was noticed, several large bones were discovered, and the well was, in consequence, abandoned. The water rose very rapidly, and only twenty-one bones or fragments were taken out. These included the left femur of an artiodactyle, several vertebræ or portions of vertebræ, and fragments of ribs. The writers obtained them from Messrs. Offiler & Co., and after examination decided to excavate for the remainder. The funds necessary to defray the expenses were readily obtained from a few local gentlemen, on condition that the bones should be finally placed in the Borough Museum. The work was commenced on April 8th and entrusted to Mr. Durant, builder. During the day a hole, 8 × 6 feet, was dug through the clay, and the water rose in it to within 6 feet of the surface. On the second day the hole was deepened through the clay and sand to the top of the gravel (9 feet 8 inches below the surface). One complete bone and twelve small pieces, probably from the head, were obtained.

On the third day the clay was tunnelled on the eastern and northern sides, the total area excavated at the bottom being about 11 by 9 feet. The tunnelling was rendered necessary because of the small space available in that part of the yard, which was limited by buildings on three sides and a wall on the fourth. The main difficulty was to contend with the water which rose from the gravel and caused the sides of the pit to fall in, notwithstanding the timbering. Two large pumps were kept at work by relays of men during the whole of the second and third days, but in spite of this most of the work had to be done in water. Under these circumstances it was impossible to get up the bones without breaking some of them. One hundred and twenty-seven bones or fragments were found. They were numbered in the order obtained, and their relative positions were noted as accurately as possible. One or both of the writers was present during the whole time, and every bucketful of sand or gravel was carefully examined. The sand and gravel taken from near the head were washed in a sieve, but no loose teeth were found. Most of the bones were obtained during the latter half of the third day. No further discoveries being made, and the water gaining rapidly upon the pumps, further work had to be abandoned.

Samples of the clay and sand were taken from the pit, and measurements and notes of the deposits passed through were made by both writers together.

Fig. 1.

The above section shows the nature of the deposits passed through. The gravel is similar in character to that covering a large area to the north-east, and is apparently continuous with it.

The excavations were made to a depth of 9 feet 8 inches, and the beds of clay, sand, and pebbles were unbroken over the area excavated. No clear line of demarcation separated adjoining deposits, but the tough sandy clay passed into yellow clay above and dark sand below. The bones were all found in the dark sand resting immediately upon the lower gravel. A sample of the dark sand was dried and the constituents separated in a sieve with meshes

$\frac{1}{40}$ inch in diameter. The portion retained in the sieve (with the exception of some quartzite-pebbles, fragments of flint, and a few very much decomposed pieces of limestone similar to those found in the same gravel-terrace at Alvaston) was sent to Mr. Clement Reid, F.G.S., who kindly examined it for plant-remains. Mr. Reid reports that 'the plants indicate a moist meadow or swampy ground, and a temperate climate. I can say nothing more definite, as the species are all widely distributed. An elytron and thorax of a beetle were found in addition to the following plants:—

Plants found with *Hippopotamus*.

<i>Ranunculus aquatilis</i> , Linn.	<i>Valeriana officinalis</i> , Linn.
" <i>sceleratus</i> , Linn.	<i>Eupatorium cannabinum</i> , Linn.
" <i>Flammula</i> , Linn.	<i>Leontodon autumnalis</i> , Linn.
" <i>repens</i> , Linn.	<i>Taraxacum officinale</i> , Web.
" <i>bulbosus</i> ?, Linn.	<i>Ajuga reptans</i> , Linn.
" <i>Sardous</i> , Crantz.	<i>Atriplex</i> ?
<i>Viola palustris</i> , Linn.	<i>Eleocharis palustris</i> , Linn.
<i>Montia fontana</i> , Linn.	<i>Scirpus pauciflorus</i> , Lightf.
<i>Rubus Idæus</i> , Linn.	<i>Carex</i> ?
<i>Potentilla</i> ?	<i>Isoetes lacustris</i> , Linn.'
<i>Hydrocotyle vulgaris</i> , Linn.	

Part of the sand which had passed through the first sieve was then sifted through others with meshes of $\frac{1}{80}$ inch and $\frac{1}{120}$ inch, and the various portions were examined under the microscope. It consisted for the greater part of a quartz-sand, the larger grains of which were well rounded, and the smaller subangular and broken, together with flakes of white mica, some of which showed a negative bisectrix in convergent light. In addition to these a very small proportion of a fine dark-coloured material and fragments ($\frac{1}{40}$ inch to $\frac{1}{80}$ inch in diameter) of probably plant or bone occurred, or perhaps both of these substances.

A sample of the blue sandy clay was similarly examined. It contained a few rootlets, and consisted of broken quartz-grains and a fine amorphous substance.

A sample of gravelly sand from the same gravel-terrace at Alvaston was also examined. Mr. Reid was unable to find any plant-remains in the sandy clay or in the gravelly sand.

The 127 bones and fragments obtained belong almost entirely to the *Hippopotamus*, and probably to one animal.

List of *Hippopotamus*-bones.

- Lower jaw (greater portion) with the two back molars and two canines.
- Five cervical, thirteen dorsal, four lumbar, and four sacral vertebrae.
- Os innominatum.
- Hind legs and feet:
 - Left femur, 21 inches long.
 - " tibia, 15 inches long.
 - " fibula (lower portion).
 - " calcaneum.
 - " cuboid.
 - " metatarsal iv.

List (*continued*).

- Right fibula (lower portion).
- „ calcaneum.
- „ cuboid.
- „ metatarsal iv.
- „ astragalus.
- Fore foot :
- Left lunare.
- „ scaphoid.
- Portions of the 3rd or 4th right and left ribs and of other ribs, to the number of six or seven.

The majority of the bones are complete ; others, such as the os innominatum, were broken in course of extraction from the matrix, but have been pieced together. As a result there are about fifty complete or nearly complete bones. They are partly mineralized, are in a good state of preservation, and do not appear to have been rolled or knocked about.

Since so many parts of the animal's skeleton were found in a small area, it is probable that the body was stranded in an old channel of the river Derwent and quickly covered up by sand and clay—not, however, before the bones had been somewhat disturbed. The lower jaw was lying upside down, with the canines pointing north-west, the fibula and left iv. metatarsal, right astragalus and calcaneum were found together on the south ; and the left femur, right iv. metatarsal, some ribs, the five cervical and some dorsal vertebræ on the north. But by far the greatest number of bones, including the os innominatum, left tibia, dorsal, lumbar, and sacral vertebræ, part of the fibula, and right and left cuboid, was found on the east and north-east.

The large number of bones, their good state of preservation, and their only slightly disturbed positions, point to the conclusion that the carcass was deposited almost entire at the spot where the bones were found. All the evidence is against the supposition that the bones have been derived from an older deposit.

In addition to the *Hippopotamus*-bones were found part of the breast-bone of an *Elephas* and part of the femur of a *Rhinoceros*. The latter was near the head of the *Hippopotamus* and is more indurated than the bones of that animal. It is also scratched and worn. Many of the bones were taken to the Jermyn Street Museum, and, by the kindness of Mr. E. T. Newton, F.R.S., were compared with specimens there.

Since the above was written, Mr. Allen (who built the Inn at Allenton about 18 years ago) was interviewed by the writers. He says that some large bones were found when a well was dug and the cellars were excavated. They were not preserved, but were sold by the labourers and probably destroyed.