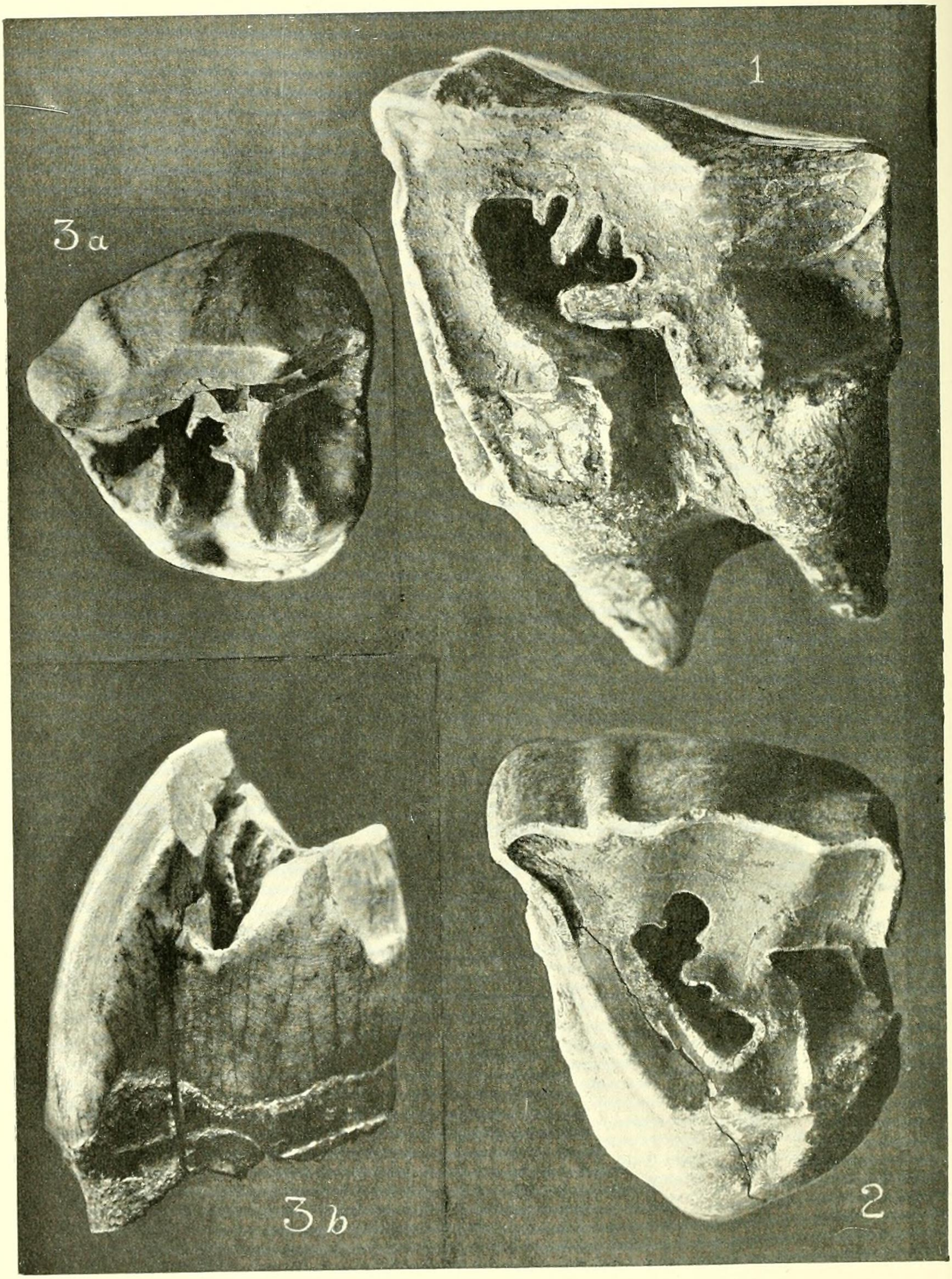

TEETH OF RHINOCEROS, FROM ILFORD, ESSEX.

old channels in the "Lockwood Reservoir," the more northerly of which is shown in Fig. 5, p. 8, ESSEX NATURALIST, vol. xii. In spite of its small scale, the photograph illustrates the disappearance of the peat bed close to the old channels and its replacement there by sand and gravel. The section has now disappeared.

ON SOME TEETH OF RHINOCEROS FROM ILFORD, ESSEX.

WITH REMARKS ON THE DISTRIBUTION OF RHINOCEROS IN THE THAMES VALLEY DEPOSITS.

By MARTIN A. C. HINTON.

[*With Plate X.*]

During the course of the last six years I have had occasion to examine many of the vertebrate remains which have been obtained from the Pleistocene deposits of Ilford, Essex. These specimens include among them a large series of the molar teeth of *Rhinoceros*, referable for the most part to the species named *R. hemitœchus*, Falconer (=*R. leptorhinus*, Owen). Some of these teeth appear to me to be of such interest and importance as to merit being described and placed on record, and they form the subject of this communication.

The first specimens to be described are three upper molars in my own collection which were obtained from the Cauliflower Brickyard in 1897. One of these is a penultimate premolar of the left side; it is somewhat damaged, the external lamina of the outer wall being lost. The posterior valley is just isolated into a reniformly triangular fossette. The transverse valley is just on the verge of isolation, but whether this had been actually accomplished or not cannot be ascertained as the inner wall of the tooth is somewhat mutilated. The crochet is strongly bifid, projecting a little more than halfway across the valley. The outer wall gives off *three* combing plates all more or less parallel with the crochet and one only of which has been touched by wear. Remains of a thick coat of cement are seen on this specimen.

The next specimen (fig. 1, plate x.) is a finely preserved second true molar of the left upper jaw. In this the posterior valley is still intact. The crochet is emitted at a right angle

from the anterior wall of the hind barrel and is closely approximated to the hind wall of the front colline, which it does not quite touch. From the middle of the outer wall no fewer than *four* combing plates project, the penultimate of which, counting from the crochet, is large and massive. The form of the crochet is more or less rectangular and the combing plates are disposed in the same general direction with it. There is a very thick coat of cement on the lower portion of the crown. The dimensions of this tooth are :—

Greatest antero-posterior length of external wall	..	2·38 inches
Antero-transverse width (at base of crown)	..	2·5 ,,
Postero-transverse width (at base of crown)	..	2·14 ,,

The third specimen is a last true molar of the left upper jaw and is, unfortunately, badly damaged. Notwithstanding this mutilation, however, it is of considerable interest. The crochet is given off at a comparately open angle and bends flexuously as it juts into the transverse valley ending off very near the anterior barrel in a sharp edge. The outer wall gives off *three* combing plates which all trend more or less in the same general direction as the crochet though they converge somewhat towards it. The valley is still further complicated above the crochet by a process which projects into it from the anterior barrel evidently resembling in this respect the tooth from Grays Thurrock described by Dr. Falconer (*Palæontological Memoirs*, vol. ii., p. 336). On various portions of the crown remains of a thick coat of cement may be seen.

From the great complication of the transverse valley in each of these three teeth, from their relative states of wear and from the similarity of their appearance, I consider them as belonging to one individual. From the form of the crochet in the premolar and the second true molar, the direction of the combing plates, and from the circumstance of the thick coat of cement which is seen on all of them I have referred these teeth to the *R. hemitoechus*, Falconer. They are cited here because of the extreme complication of the transverse valley of which they afford a fine illustration and which is characteristic of many of the teeth of this species from Ilford.

The specimen described next was submitted to me for identification by Mr. G. White who obtained it with others from one of the pits on the Uphall Estate, the sections and fossil contents of which have lately been described in the admirable

papers by himself and Mr. J. P. Johnson which have appeared in the Essex Naturalist. It is a detached fourth premolar of the left upper jaw. The transverse valley is completely isolated through wear and into it, from the posterior barrel, is projected a strongly developed bifid crochet. The outer wall gives off two very small combing plates, one of which is parallel to and just above the bifid crochet. The other is given off in a line with the anterior external angle of the tooth, converging towards the first and the crochet at a right angle. The posterior valley is not yet isolated, and the cap of enamel which arises from its inner wall, and which passes over the hind barrel and so into the inner wall of the tooth is still in great measure intact (fig. 2). There is a well marked basal bourrelet passing right round the anterior barrel. This starts from near the grinding surface a little inwards from the anterior angle; from this point it gradually sinks until the inner extremity of the anterior barrel is reached, from whence it rapidly rises up again ending off at the inner and forward rim of the enamel cap before spoken of. The dimensions of this tooth are :—

Antero-posterior length measured along	outer	surface	at base	..	1·7 inches
,, ,, ,,	inner	,,		..	1·25 ,,
Antero-transverse width at base	..	..		..	2·47 ,,
Postero- ,, ,, ,,	..	..		..	2·2 ,,
Height of crown at junction of anterior and posterior barrels				..	1·4 ,,
,, ,, anterior outer angle	..	..		..	1·88 ,,

I have referred this specimen to *R. leptorhinus*, Cuvier, *pro parte* (=*R. megarhinus*, De Christol). The point to which I wish to direct special attention is the remarkable state of wear and the figure will give a much better idea of the characters described here than any mere verbal description. In all known species of *Rhinoceros*, either fossil or recent, the small posterior valley is the first to be isolated into a fossette by the detrition of the tooth. This arises from the fact that while the entrance to the posterior valley is comparatively shallow, not cutting deeply into the body of the tooth, being from this cause soon obliterated, the entrance to the transverse valley forms a much deeper cleft separating the barrels and consequently remaining for a proportionally longer period intact. But in this specimen it is the transverse valley which has been isolated first, the posterior valley having its entrance still intact though cutting into the tooth no deeper than usual. This malformation appears to me

to be of great interest, the only other instance of which I am aware occurring in a fourth premolar of the upper jaw which Dr. Falconer referred to *R. etruscus* and which is figured in the *Palæontological Memoirs*, vol. ii., Pl. xxv., fig. 6. This latter specimen is from one of the Italian Pliocene deposits and is now preserved in the museum at Pisa.

The next specimen to be noticed was also obtained by Mr. G. White from one of the Uphall sections. This is a slightly worn penultimate molar of the left upper jaw. The crochet is thin and wedge shaped and is projected well across the transverse valley. The external wall gives off a large combing plate converging at a right angle towards the crochet, while just above the latter from the anterior barrel projects another little combing process. The large combing plate is placed nearly diagonally to the anterior outer angle of the tooth. The barrels have their apices compressed and somewhat twisted, making the entrance to the transverse valley appear very wide. There is a small prominent tubercle in the entrance of the latter between the barrels. The dimensions of this tooth are:—

Antero-posterior length external) of crown	..	3·0 inches
Antero-transverse width, at base ..	..	2·5 ,,
Postero-transverse width, at base ..	..	1·9 ,,

This specimen is very characteristic of the *R. leptorhinus* Cuvier, *pro parte*, to which species I have referred it.

In the collection of Dr. Frank Corner, F.G.S., there is a fine first upper true molar of the left side obtained by him from the Cauliflower Brickyard. This has the crochet thin and wedge shaped, and given off at a somewhat acute angle. A small combing plate is projected from the external lamina in a line with the antero-external angle. The posterior valley of the tooth is still intact. The anterior colline is large and shows the apical contortion characteristic of the species to which I have referred it. There is a well marked emarginate bourrelet passing round the base of the front colline. The posterior barrel or colline is broken, but shows apical contortion in section. The enamel is smooth, with a rather thick coat of cement upon the lower part of the sides of the crown. The dimensions of this tooth taken at the base of the crown are:—

Antero-posterior length (externally)	..	2·49 inches
Antero-transverse width ..	..	2·66 ,,
Postero-transvere width ..	..	2·05 ,,

This tooth I have referred to *R. leptorhinus*, Cuvier, *pro parte*, of which it is very typical. It is the only example of this species that I am acquainted with from the Cauliflower Brick-yard.

The last specimen I have to notice is in the collection of Mr. J. P. Johnson who obtained it with others from the Uphall section (Figs. 3 and 3a). This is a fine and slightly worn ante-penultimate premolar of the left upper jaw. Its large size would seem to indicate the *p.m.* 3 rather than the *p.m.* 2, but that it is the latter is perfectly clear from the sub-triangular form of the crown, the form of the anterior colline, and the absence of a pressure scar in front. The latter character proves that there was no first premolar in this individual. The anterior colline is seen to form a completely isolated conical cusp exactly as in the specimen figured by De Christol in his memoir in the *Ann. des Sciences Nat. Zool.*, ser. 2^{me}, vol. iv., pl. 3, fig. 12. The apex of this cusp is worn off, a small elliptical disk of wear being the result. Figures 3 and 3a will give a much better idea of this specimen than any description. It is referred to the *R. leptorhinus*, Cuvier, *pro parte*, of which species it is very characteristic. Subjoined are the dimensions of this specimen together with some corresponding ones given by Falconer of this species and by Dawkins of the homologous tooth in *R. hemitoechus*, Falconer.

P.m. 2 *R. leptorhinus*, Cuvier *pro parte*. (=*R. megarhinus*, De Christol).

	Ilford.	Falconer *op. cit.*
Antero-posterior length ..	1·6 in.	1·55 in., 1·45 in., 1·95 in., 1·55 in.
Greatest-transverse width ..	1·76 ,,	1·70 in., 1·60 in., 1·70 in., 1·60 in.

P.m .2 *R. hemitoechus*, Falconer (=*R. leptorhinus*, Owen), Dawkins, (*Q.J.G.S.*, vol. xxiii., p. 213).

Antero-posterior length ..	1·15 inches ..	1·15 inches.
Greatest-transverse width ..	1·40 ,, ..	1·28 ,,

The distribution of the species of *Rhinoceros* in the Middle-Terrace deposits of the Thames Valley below London is of considerable interest. At Ilford *R. hemioetchus* is by far the commonest form; remains of *R. leptorhinus* occur in fewer numbers but still fairly abundantly, while *R. antiquitatis* is of very rare occurrence. At Grays Thurrock *R. leptorhinus* ranks first in abundance, *R. hemitoechus* being the rarer; and *R. antiquitatis* not known from this locality. At Crayford and Erith on the other hand the commonest remains are those of *R. antiquitatis*,

the other two species occurring but very rarely. In this connection it is of interest to note that in the case of Ilford the remains of the prevalent species of *Rhinoceros* exhibit a tendency to vary towards the prevalent species occurring at Grays Thurrock in the greater complication of the transverse valley of the molars by combing plates—a character much more common in *R. leptorhinus* (the Grays form) than in *R. hemitoechus*. A precisely analogous instance is presented in the relationship between the Elephant remains found in the deposits of the two localities. At Ilford *Elephas primigenius* is the common form, while at Grays Thurrock this position is held by *E. antiquus*. But many of the molars from Ilford of the Mammoth depart from the typical form of that species and by having plates of thicker enamel, more or less complicated by crimping, they approach in appearance what is seen in *E. antiquus*.

In the present state of our knowledge, no conclusions can be with safety drawn from these facts of distribution. They, in common with many other ascertained facts of Pleistocene Geology and Palæontology, indicate important portions of the history of the Thames Valley, but these portions we cannot read until we have been able to appreciate many factors which as yet are but little understood.

In conclusion I have to express my best thanks to the gentlemen mentioned in this paper for the loan of their specimens and my warmest gratitude to Mr. F. W. Reader for his kindness in preparing the admirable figures in the accompanying plate.

THE TWO FORMS OF THE SEA-ASTER (ASTER TRIPOLIUM).

By PERCY CLARK, B.A.

As I now write (September 6th, 1901) the Essex Salt-marshes, bordering the sea, which are overflowed by the water at springtides, present a beautiful appearance. The tall upstanding masses of the Sea-Aster growing there in wild and unchecked profusion, are all in flower, and their small golden heads massed together in thousands shed a glow of soft yellow colour over the Saltings. But a few paces inland where the