series and the lowest Silurian rock is a good reason for believing that the gneiss of Bohemia and Bavaria is truly the representative of the Laurentian or Fundamental Gneiss.*

II.—ON A SUDDEN SINKING OF THE SOIL IN A FIELD AT LEXDEN IN ESSEX.

By the Rev. O. FISHER, M.A., F.G.S.

IN the month of May, 1861, there occurred a curious subsidence of the soil in a field on the 'Malting Farm' at Lexden in Essex. The cavity thus produced was about twenty-five yards in circumference, of an elliptical form, and about twenty feet in depth, with the sides slightly overhanging. The subsidence took place quite suddenly; some workmen, who were in the field in the forenoon, finding the pit fresh formed on their return from dinner. The ground in which the pit is situated consists of a slightly rising bank of valley-gravel, and is about fifty yards to the south of the little River Colne, which runs past the spot, and gives its name to the ancient town of Colchester. The surface of the field cannot be more than five or six feet above the stream when full.

The sides of the pit are clean-cut in the gravel, which is stratified and has evidently never been disturbed. Though at the time of the occurrence the event excited great local interest, yet I did not myself hear of it until a year ago. I then found it, after a rainy time, containing a little water at the bottom, in the funnel-shaped cavity which was formed of the impervious surface-soil that had subsided; but it was evidently not spring-water. See the accompanying section.

Diagram-section of a Natural Pit near Lexden, Essex.

a. River-level.

b. Low-level Gravel (6 feet thick above the river-level).

Such are the phenomena: and the question is, how are they to be explained? The subsoil of the valley is London Clay, which is seen at the bottom of Lexden brick-pit (that cemetery for extinct Pachyderms; see Quart. Journ. Geol. Soc., vol. xix. p. 393), about half

* Quart. Journ. Geol. Soc., vol. xix. p. 359. Looking to the total divergence of their strike, I am of opinion, that the Laurentian rocks of the North-western Highlands, as well as those of the North-west of Ireland, will prove to be the 'Lower Laurentian' of Logan.

a mile distant to the east. It so happens that several Artesian wells have been sunk not far off, so that we know the sequence of beds in the neighbourhood. The late Mr. J. Brown, of Stanway, supplied me with the following section of the well at the Colchester Water-works, which is situated on the edge of the same valley a mile to the east.

*Section of the Artesian Well at the Colchester Water-works.**

Vegetable soil and low-level gravel . . .	12 feet.
London Clay, with much green sand in the lower beds	105 "
Woolwich and Reading beds	25 "
Chalk, bored	152 "
<hr/>	
Plenty of good water at	294 "

At another well, which was commenced, but abandoned, at the Cavalry-barracks, about two miles to the south-east of the subsidence, the thickness of the London Clay and Lower Tertiaries was found to be 211 feet, and the Chalk was reached at 237 feet.

Noticing that at the water-works the Chalk was reached at 142 feet, this gives the difference of depth for the top of the Chalk, at the two localities, as 95 feet, which must be very nearly the difference of surface-level of the two places. This shows that the surface of the Chalk is, in all probability, nearly horizontal, and consequently deeply covered by clays at Lexden. We are precluded, therefore, from attributing the subsidence to an ordinary pipe in the Chalk,† for such could not have been formed beneath so great a thickness of clays. Had Chalk been the immediate subsoil, such a subsidence might have occurred; for it is probable that the pipes formed by the percolation of rain-water through Chalk are not always filled up by the falling in of the superficial beds keeping pace with the formation of the cavity. The workmen at Horstead Chalk-pit in Norfolk (where the Chalk is wrought beneath a thick covering of Norwich Crag) assured me that they occasionally came upon hollow pipes, roofed over by the ‘uncallow,’ i.e. the Crag deposits. This is quite probable, on account of the firmly compacted bed of great flints which immediately cover the Chalk. But such an explanation will not apply to our present problem.

That there must be a vacuity somewhere beneath the subsidence is clear. That it should be in the gravel is impossible, because the stratification, as exposed in the sides of the hole for about 10 feet, is perfectly regular; that it exists in the London Clay is also impossible; but that such a cavity should exist in the Chalk is probable. I conceive it may be connected with the chasm from which the supply of water to the Colchester Water-works is obtained.

* I am indebted to Mr. Prestwich for a correction to Mr. Brown's note, as also for the measurements of the well at the Cavalry-barracks.

† See the Author's paper ‘On some natural Pits on the Heaths of Dorsetshire,’ Quart. Journ. Geol. Soc., vol. xv. p. 187.

When the well was bored, the tool, after passing through a layer of flints, sunk suddenly, and the water rushed up with a force that (as the late Superintendent expressed it to me) shook the hill. This shows that the spring is connected with an extensive and free reservoir. There are two other wells, at distances of a mile and a mile and a half, in a straight line east of this one, which are evidently connected with the same reservoir; for on Mondays, when the pumps are not at work at the Water-works, the water stands higher than usual in those wells. I conceive, then, that the motion of the water in this subterranean reservoir, caused by the draught of water at these wells, disturbed the equilibrium of the roofing of the chasm at a point where it was barely stable, and caused the subsidence in question.

This is rendered the more probable because it is evident that this natural pit is on a line of subterranean drainage, as is shown by the hole being dry at a level lower than that of the river. The water in the Colchester well stands at about 10 feet below the level of the river; which being more than a mile lower down the stream, would give at Lexden a greater difference between the subterranean and surface-drainage levels.

III.—ON THE CRAGS OF SUFFOLK AND ANTWERP. (PART I.)

By E. RAY LANKESTER, Esq.

THE Suffolk Crag.—There are few deposits in this country which form so admirable a field for study as the Crag* of Suffolk. Unique as to age, the sole representatives in England of the great Pliocene deposits of Europe, it becomes a matter of very high interest to identify them in any way with particular strata in other countries. The lowest of these Crag occurs in small patches over an area of about eighty square miles, and consists of either loose or compact light-coloured sand, alternating with bands of *Polyzoa*, which sometimes form a kind of limestone. From this Crag 299 species of *Mollusca* have been obtained: of these, 148 are extinct, 151 are

* The most important notices and memoirs that have been written on the Crag of Suffolk and Essex are—by Mr. Charlesworth, *Proceed. Geol. Soc.* 1835, vol. ii. p. 195; *Phil. Mag.* 1835, 3rd Ser., vol. vii. pp. 81, 465; *Report Brit. Assoc.* 1836, *Trans. Sect.* p. 84; by Sir C. Lyell, in his ‘*Principles*’ and ‘*Elements of Geology*,’ and in the *Mag. Nat. Hist.* 1839, New Ser., vol. iii. p. 313; Mr. Prestwich, *Quart. Journ. Geol. Soc.* 1849, vol. v. p. 350; Mr. S. V. Wood’s *Monograph of the Shells of the Crag* (2 vols. 1848–56; *Palaontographical Society*), and his paper on the Extraneous Fossils of the Red Crag, *Quart. Journ. Geol. Soc.* 1858, vol. xv. p. 32; and Mr. S. V. Wood, jun., on the Red Crag, *Annals Nat. Hist.* 1864, 3rd Ser., vol. xiii. Besides the *Mollusca*, the *Cirripedia*, *Echinodermata*, *Polyzoa*, *Corals*, and *Entomostraca* of the Suffolk Crag have been figured and described in the *Monographs of the Palaontographical Society*. The Crag of Antwerp were treated of by Sir C. Lyell in the *Quart. Journ. Geol. Soc.* 1852, vol. viii. p. 281, &c.; and several papers on these deposits and their fossils are to be found in the publications of the Brussels Academy, &c. Reuss has described the *Foraminifera* of the Antwerp Crag in the *Proceed. Vienna Acad.*, vol. xlii., 1860, p. 355, &c.