

The immense territory in North America—several hundred thousand square miles in extent, underlain by the formations mentioned above, in an unaltered state—assures the world that the petroleum of the New World, like the coal, is probably practically inexhaustible.

6. Petroleum is unquestionably of organic origin. In my opinion the great mass of it has been derived from plants; but some think it comes from animals, being either a fish-oil or a substance related to adipocere. It does not appear to be the result of a natural distillation of coal, since its chemical composition is different from the oil manufactured artificially from the cannels, containing neither nitro-benzole nor aniline. Moreover, petroleum occupied fissures in the Silurian and Devonian strata long before the trees of the Coal period were growing in their native forests. The nearly universal association of brine with petroleum, and the fact of the slight solubility of hydro-carbons in fresh, but insolubility in salt water, excite the inquiry whether the salt-water of primæval lagoons may not have prevented the escape of the vegetable gases beneath, and condensed them into liquids? The hint appears to be worthy of consideration.

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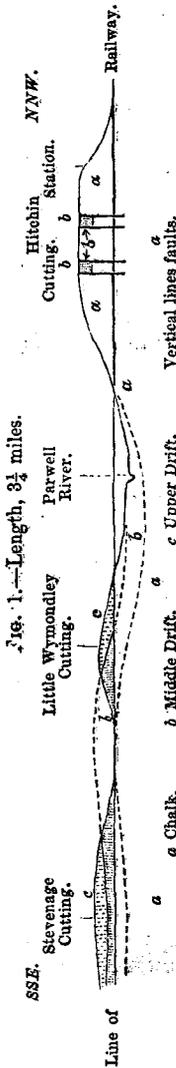
## CORRESPONDENCE.

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### *To the Editor of the GEOLOGICAL MAGAZINE.*

SIR,—THE FAULTS IN THE DRIFT AT HITCHIN, made the subject of correspondence in your Magazine, were shewn by me in the lithographic sections accompanying the map of the Drift of the East of England, which I printed for private distribution in May, 1865; and a copy of which is in the libraries of the Geological Society, of the Woodwardian Professorship, and of those of most other scientific bodies. This was more than a year before Mr. Salter, unacquainted, as I understand, with that work, had his attention attracted by them. I now write to call your readers' attention to the fact that the most striking features of the Hitchin section do not appear in Mr. Salter's paper. The sand and gravel which has been slightly faulted at the Station, is that which, in thickness varying from twenty-five to sixty feet, underlies the wide-spread Boulder-clay (termed by me the Upper Drift) over most of the East of England; but which has a more limited extent in the north-east portion of the Central Counties, where the upper Drift rests most frequently on the older rocks. Now this sand and gravel (or middle Drift) is always strictly conformable to the upper Drift; and over western Hertfordshire lies generally at the surface, owing to the denudation of the upper, which there occurs only in outliers. In the centre of Herts, between Baldock and Buntingford, and for some way south of the latter place, it is generally absent, the upper Drift resting on the Chalk. If any of your readers will walk up the Great Northern Railway, from Hitchin to Hatfield, they will see, at Wymondley cutting, this middle Drift rising up sharply from beneath the upper, and (except where it is capped, near Stevenage, by the upper) occupying the cuttings as far

as Hatfield station; some way north of which, and close by the Luton-line junction, there was some time ago well shewn, by the removal of some of the material for ballast, the upper Drift for a space of several yards faulted perpendicularly into the middle. The section, however, between Hitchin and Wymondley shews, not only that the Drift has been faulted in the way seen at Hitchin station, but that the whole mass of Chalk, through which Hitchin cutting passes, has been forced up since the Drift was deposited. The following is the section:— (See Woodcut, Fig. 1.)



The faulting of the Drift is a common thing in the East of England, and one or other of the following instances may, perhaps, fall within the convenience of some of your readers to observe for themselves.

In a pit in the N.E. portion of Ordnance Sheet 50, and adjoining the farmhouse, three furlongs S. E. by E. of Bulchamp workhouse, and eleven furlongs from Blythford church, the upper Drift occurs side by side with sand; the two standing against each other like a wall. This sand I believe to be that which intervenes between the Crag and Chillesford beds, in which case the vertical drop of the upper Drift cannot be less than forty to fifty feet. If, however, it be the sand of the middle Drift, then the drop is proportionately less. A pit marked "Sandpit" in the S.E. corner of the same sheet, nine furlongs S.S.E. of Chillesford church, and adjoining the Butley River, shews exactly the same thing in all respects. A pit in Sheet 49, marked "clay and sandpit," four furlongs from the shore at Sizewell Gap, shews the junction beds of the upper and middle Drift, conformably to each other, but tilted at an angle of about twenty degrees with the horizon.<sup>1</sup> A pit two miles S.W. by S. of the last pit, and one furlong South of Aldringham church, shews the same junction beds arching (by lateral pressure as I regard it) in a double curve, like the letter *o* laid horizontal, but less sharply bent than the curves of that letter. The coast section between Pakefield and Kessingland, and a little north of the lighthouse, shews a small fault of some six or eight feet; and another between Corton and Hopton of about equal extent that has caused a depression which has been filled with post glacial gravel; both of these extend through the upper and middle Drift. A third, between Hopton and Great Yarmouth, shews

<sup>1</sup> This was shewn in the sections accompanying a paper on the crag and drift in Ann. and Mag. of Nat. Hist. for March, 1864.

the upper Drift dropped into the middle Drift, of which the cliff is composed, and the whole capped unconformably by Post-glacial gravel. The Brickfield at the north end of the low cliff on which Southwold stands (Sheet 49) shews a series of Post-glacial sands, interstratified with white marl containing freshwater shells, resting on the upper Drifts, and with that Drift thrown into an angle of more than  $45^\circ$  with the horizon. At Rockland Staithe,  $6\frac{1}{4}$  miles E.S.E. of Norwich Castle, the beds intervening between the Crag and middle Drift are faulted; but it requires a familiarity with the beds, or a description which the compass of a letter will not allow, before the extent of the fault could be shewn. A pit in the S.E. corner of Sheet 66, one mile and six furlongs N.N.E. of Beccles church, and two hundred yards above the fine exposure of the Chillesford beds, shews (unless now worked out) Post-glacial gravel faulted into the sand of the middle Drift, and standing like a wall against it for several feet.

These throws affect the Drift; but more important than these, because affecting beds much newer than the Drifts, are those which occur in the Post-glacial series. One of these is shewn by Messrs. Topley and Foster, in their paper on the Medway gravels; two others were given by me in the papers, in your Magazine, on the Thames and East Essex gravels; one of them being at Bradwell-on-Sea, and the other in Wickham Lane, near Woolwich; the latter is very accessible to your London readers, and is just now well exposed by a three-sided projection which shews the stratification very finely and that it is not due to the oblique bedding, as well as the amount of the dip,  $18^\circ$  to  $20^\circ$ , directly towards the fault which brings up the Chalk face on the opposite side of the lane.<sup>1</sup> Lastly, there is that at Higham shewn by me in the sections in your numbers for February and March last.<sup>2</sup> This is the most important of all, because it affects a

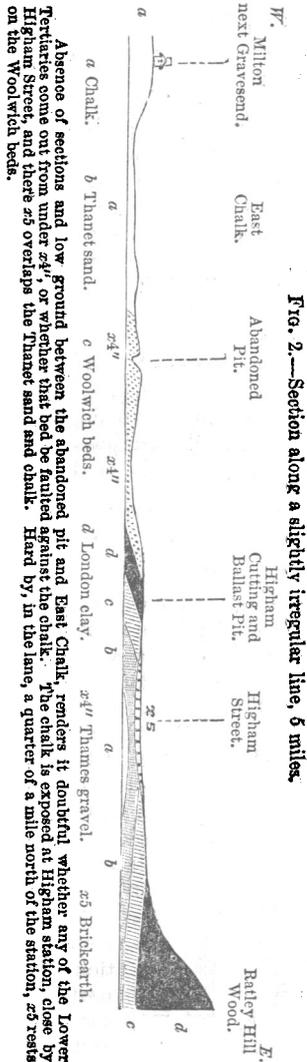


FIG. 2.—Section along a slightly irregular line, 6 miles.

<sup>1</sup> There are two brickfields in the lane, this is in the nearest to Wickham church.

<sup>2</sup> GEOL. MAG. Vol. III. pp. 57 and 99.

formation as much newer than the Drift as is implied by its occupation of a trough cut down, in its deepest part to more than 500 feet from the upper Drift; and because it is also in intimate connexion with the disturbances under which the Thames gravel emerged. In the sections I gave in your Magazine, space necessitated this being shewn as a vertical drop, but in reality it arises from a pitch in a north-west direction, as the following detailed section shows:—(See Woodcut, Fig. 2.)

These are instances in which actual ocular evidence of violent dislocations is obtainable. There are many more which are deducible from the structure of the crag and Drift, and I believe that many of the sections in these upper beds which present perplexing features are due to this cause. Thus the capping of Boulder-clay which rests on the Chillesford beds, at Chillesford, and which Mr. Fisher, in his paper, read before the Geological Society, brought into his evidence of "trail," I believe is nothing but an oblique throw of the upper Drift, on to the Chillesford beds; for in a pit, only a furlong and a half north of this section, there occurs one of the junction of the upper and middle Drift, which shews both these formations in strict conformability to each other, and arching under the influence of lateral pressure, somewhat in the same manner in which the beds are exhibited in the section of Aldringham church.

I am, Sir, etc.,                      SEARLES V. WOOD, JUN.

#### FAULTS IN THE DRIFT AT HITCHIN.

*To the Editor of the GEOLOGICAL MAGAZINE.*

DEAR SIR,—My friend, Mr. A. H. Green, who is nothing, if not critical, has been very gentle in his criticism in my case; and, indeed, he is so genial a man that I am sure it must go against his grain, and be an act of stern duty in any case to find fault at all. Perhaps this may be the reason why he overlooked the faults at the Hitchin station. I can hardly think they have grown larger since his visit. But there they are; and confused as the mass of gravel and loam, which form the Boulder-drifts in that locality, may be, there is a tell-tale bed of conglomerate at the bottom which has betrayed all its movements—while surely, not even a tyro could mistake the dark brown gravel which caps the drift and fills the pipes, and which is so common in the Hitchin section, for the light-coloured sand and loam below.

The uneven surface of the Chalk here is indeed due to the same cause which has produced so many inequalities in the surface of our island—viz., the much-abused "unequal elevation" of faulted ground, however these faults may have been produced. In the case of the Chalk, that may, no doubt, in some cases be due to sinkings over subterraneous cavities produced by rivers and streams in Post-glacial times. For this idea I am indebted to my friend and former colleague, Mr. Thomas T. Mc K. Hughes, with whom I had previously examined the Boulder-drifts near Hertford, and therefore came to the section more prepared for examination than I should otherwise have been.