results obtained while sinking the wells on eighteen of their sites. also the forecast by Dowser *B* of a site chosen by a geologist. The results are as follow:

Dowser *A* at Site 1 (Biskra)

	Forecast	*Fact*
Strata	0–36 m. (118 ft.) Impervious clays, etc.	0–58 ft., brown clay. –143 ft., gravels, with bands of gravelly clay.
Water	Between 31·25 m. and 34·88 m. (102·5 and 114·4 ft.)	At 80 ft.
Static level	2 m. (6·5 ft.) above surface	66 ft. below surface.
Yield	1,240 cub. m. (273,000 gallons) per hour (flowing)	2,500 gallons per hour (pumping).
comment	Free flowing potable water rising through a fault	Hard, very saline water, potable only in emergency.

Dowser *B* at Site 2 (Beni Messous). Located by geologist

Forecast	*Fact*
No water would be obtained	Main water-level found at 235–240 ft. Static level 187 ft. below surface. Yield 850 gallons per hour, of very good quality potable water.

Dowser *B* at Site 3 (Beni Messous)

This was 300 yards distant from Site 2, and was located after that Site had been successfully drilled; it was downhill from, and within 20 yards of, the uncased outfall of a hospital sewage disposal plant.

	Forecast	*Fact*
Strata	0–36 m. or 40 m. (118 or 131 ft.) gravel and loam, with traces of water –50 m. (164 ft.) sand and gravel, with water –53 m. (174 ft.) gravel with flowing water	0–212 ft. grey clay, stony 202–212 ft. –232 ft. pebbly sandstone. –236 ft. red clayey sand. –260 ft. ancient schists.
Water	See above	At 212 ft.
Static level	(Above ground-level)	113 ft. below surface.
Yield	Plenty of water; the intersection of two streams	500 gallons per hour, pumping. Quality, as at Site 2.

This well was completed under geological advice. The authorities were prepared to abandon it at 200 ft., where it was quite dry.

Dowser *C* located sixteen sites which were proved, mostly by drilling, a few by hand digging. Of these, fourteen were dry holes or yielded too small a supply to be worth pumping, and were abandoned. On test, one well yielded 150 gallons per hour, and another 350–400 gallons per hour. The depths ranged down to 208 ft., but thirteen were of 50 ft. or less. Three may be described in detail; the others showed a similar degree of correlation between forecast and fact.

Dowser *C* at Site 4 (near Philippeville)

	Forecast	*Fact*
Strata	0–20 ft. sand –100 ft. clay. At 105 ft. gravel with water.	0–150 ft. sand. Well abandoned, quite dry.

Dowser *C* at Site 5 (Jemmapes)

Forecast	*Fact*
Water in useful quantities at 92 ft., 190 ft. and 230 ft.	Slight trace of water at 76 ft. Well below 15 ft. drilled practically throughout in clayey strata, and stopped at 208 ft.

At this stage, water at 68 ft. was stated by the dowser to be shut out by the well-casing. This casing was therefore withdrawn to above that depth, but the hole remained dry. The dowser then had 18 lb. of high explosive detonated at 68 ft. to open up the strata and to let in the water, but the only result was a shower of dry clay.

Dowser *C* at Site 6 (Philippeville)

This forecast was made after nineteen auger holes ranging from 3 ft. to 22 ft. deep had been made over the area.

	Forecast	*Fact*
Water	At 14 ft.	At 12 ft. 6 in.
Static level	10 ft.	12 ft. 6 in.
Comment	The intersection of three streams	Since little water was found, boring was continued to 40 ft. without success. It was then converted into a dug well, 15 ft. 6 in. deep, with perforated casing in the bore below this level. The well then yielded 350–400 gallons per hour.

The above forms the sum total of my experience of 'water divining' in Algeria.

It is difficult to appreciate any significant correlation between the information purported to be given by the dowsers in their forecasts and the facts later established—a conclusion perhaps of some practical value.

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[1] *Nature*, **151**, 118 (1943).
[2] *Roy. Eng. J.*, **58**, 301 (1944); **59**, 148 (1945).

Nuées ardentes and Ignimbrites

A MODERN text-book of volcanology by Prof. C. A. Cotton, published under the somewhat misleading title "Volcanoes as Landscape Forms"[1], has recently been reviewed in *Nature* by Prof. Arthur Holmes[2]. The book is beautifully illustrated and well documented; it thus fills a gap in British volcanological literature and is likely to be widely read by students of geology. For this reason it seems desirable to add to Prof. Holmes' constructive criticisms by directing attention to certain statements made by Prof. Cotton (pp. 199–215) which seem likely to mislead the reader on two important points: (1) the mode of origin of the *nuée ardente*, from the volcano Montagne Pelée, which overwhelmed the town of St. Pierre in Martinique in 1902; and (2) the state of consolidation of the deposits formed by *nuées ardentes* in the West Indies.

The term *nuée ardente* is used to describe a swiftly moving and very hot avalanche composed of lava blocks and fragments and rapidly expanding dust-laden gases. Such an avalanche with its accompanying dust-laden cloud is the product of a special type of explosive volcanic eruption which was unknown until 1902, when it was studied in the West Indies by Lacroix in Martinique and by Tempest Anderson and Flett in St. Vincent. Controversy arose as to the relative importance of a directed explosive blast, as opposed to the action of gravity alone, in giving to a descending *nuée ardente* its direction and speed. It is now, however, generally agreed that: (*a*) the descent of some *nuées ardentes* is controlled by a directed explosive blast (those discharged laterally from below a 'dome' of almost solid lava occupying a crater, for example, Mt. Pelée and Lassen Peak in California); (*b*) the descent of other *nuées ardentes* is controlled by gravity alone (those produced by an initial vertical explosion in a domeless crater, for example, the Soufrière of St. Vincent, and Kloet in Java); and (*c*) the *nuée ardente* which overwhelmed St. Pierre in 1902 was of the first-mentioned type ("nuée péléenne d'explosion dirigée" of Lacroix) and was thus the manifestation of an exceptionally dangerous type of volcanic eruption[3].

Prof. Cotton, however, states (p. 200) that the *nuée ardente* which overwhelmed St. Pierre "frothed over from the crater of Mt. Pelée and was sufficiently voluminous to spread widely . . ."; he gives no reasons for contradicting Lacroix and Perret, the acknowledged authorities on the eruptions of Mt. Pelée.

Nuées ardentes leave in their trail a chaotic deposit of lava fragments (often very large blocks), volcanic ash, and very finely divided volcanic dust. A characteristic feature of such deposits in Martinique[4], in St. Vincent[5] and in Montserrat[6] is their loose, unconsolidated state. Nobody has ever described welded or agglutinated tuffs ('ignimbrites') as products of *nuées ardentes* in the West Indies.

Prof. Cotton, however, in his account of the occurrence and formation of ignimbrites, leaves the reader with the distinct impression that *nuées ardentes* of the type which overwhelmed St. Pierre in 1902 (called by him "voluminous or first-order *nuées ardentes*") usually form extensive and thick sheets of ignimbrite, a firmly agglutinated lava-like rock (pp. 199, 200 and 215). He makes no adequate comment on published descriptions of the deposits left by *nuées ardentes* in the West Indies.

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Oct. 20.

[1] Cotton, C. A., "Volcanoes as Landscape Forms" (Christchurch and London: Whitcombe and Tombs, 1944).
[2] Holmes, A., *Nature*, **156**, 156 (1945).
[3] Lacroix, A., Livre Jubilaire 1830–1930, Soc. géol. de France, **2**, 457-465 (1930). Perret, F. A., "The Eruption of Mt. Pelée 1929–32", *Pub. Carnegie Inst.*, No. 458, 84 (1935). Escher, B. G., *Leid. geol. Meded.*, **6**, Aft. 1, 45-58 (1933). Holmes, A., "Principles of Physical Geology" (Edinburgh: Nelson, 1944), 462, 469.
[4] Lacroix, A., "La Montagne Pelée et ses Éruptions" (Paris: Masson et Cie., 1904), 375–382. Perret, see ref. 3, 48–50.
[5] Anderson, T., and Flett, J. S., *Phil. Trans.*, A, **200**, 428–449 (1903).
[6] MacGregor, A. G., *Phil. Trans.*, B, **229**, 30–34, 67 (1938).

Authenticity of Scientific Anecdotes

Dr. Clement Webb and Prof. Bernard Cohen discuss in *Nature* of February 16, p. 196, the origins of two anecdotes associated with Faraday's demonstration of magneto-electricity mentioned in my book "Discovery", published in 1916. In correspondence with Sir Henry Tizard a short time ago, I suggested that Faraday was aware of Franklin's apt reply, "What is the use of a new-born child?" when asked the use of an invention, and he quoted it in connexion with his own discovery when asked a similar question. In my book, the inquiry was said to have been made at the end of a lecture at the Royal Institution whereas, as Prof. Cohen shows, the occasion was a lecture at the City Philosophical Society and the subject was not magneto-electricity but the discovery of chlorine by Scheele.

Prof. Cohen asks for information upon the second anecdote relating to Faraday's reply to a statesman who asked what was the use of a particular discovery and was told that in all probability he would soon be able to tax it. As stated in my book, the source from which I derived this story was Lecky's "Democracy and Liberty", in the Introduction of which, p. xxxi, the following mention is made of Gladstone's attitude towards scientific studies:

"There were, it is true, wide tracts of knowledge with which he had no sympathy. The whole great field of modern scientific discovery seemed out of his range. An intimate friend of Faraday once described to me how, when Faraday was endeavouring to explain to Gladstone and several others an important new discovery in science, Gladstone's only commentary was 'but, after all, what use is it?' 'Why, sir,' replied Faraday, 'there is every probability that you will soon be able to tax it.'"

Lecky was a distinguished historian, but as he relates only what was told to him I am afraid the evidence as to the truth of the story must remain inconclusive.

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