

liminary experiments with air have shown that the velocity can be easily determined with an accuracy of 1 part in 300, probably 1 part in 1000. The frequency of the vibration is measured by sending the current through the wire of a string galvanometer and recording the movement of the wire photographically, with the record of a standard tuning fork as a comparison. The accurate running of the fork is at present fixing the limit of accuracy.

Other observations are concerned with the behaviour of very small particles which take up practically the full amplitude of the air vibration, and appear as little lines of light when strongly illuminated.

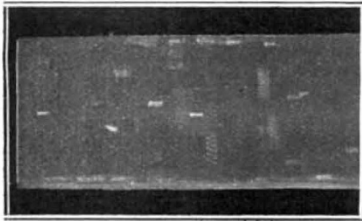


FIG. 3.

The lines, or 'needles', as we have called them, have a length of some millimetres when the tube is run on the fundamental note with one end open. They have also been observed, if in a less developed form, by M. Z.

Carrière, and described by him in a paper in the *Journal de Physique* for May 1929, a note of which in the research items of NATURE of Sept. 28 directed our attention to it. The independence of our observations is established by the fact that we showed these needles publicly in a demonstration at the Royal Institution on Friday evening, Mar. 22, before M. Carrière's paper was published. Whereas M. Carrière records that he failed to photograph the needles, we have succeeded in obtaining very definite photographic records, of which Fig. 3 is an example, which shows both larger and smaller particles, the larger ones not taking up the full amplitude of the air vibration. The effect of a sideways drift of some of the particles, which develops a sinusoidal form for the path, is also clearly visible. Measurement of the length of the finest needles seems likely to lead to interesting results.

E. N. DA C. ANDRADE.  
S. K. LEWER.

Physics Laboratory,  
University College,  
London, W.C.1, Oct. 11.

#### Dew: Does it Rise or Fall?

DR. SIMPSON (NATURE, Oct. 12, p. 578) has misstated my view. It is clear that when I wrote real dew rises as vapour from the ground I referred to the source of the dew and not to the dew itself, and therefore regarded as vapour "it may be said" to rise. It was therefore unnecessary for Dr. Simpson to point out that dew is water and not water vapour. I have given some time to the study of dew, and though Dr. Simpson offers the generally accepted explanation of its formation, it is curious to observe how capriciously dew appears to deposit, some objects remaining quite dry on a dewy night, whilst others in close contact are covered with moisture.

In general the phenomena can be readily accounted for by vapour from one or other of the sources mentioned in my former letter.

Dr. Simpson says we have no word to describe water condensed in the air. In a paper published in the *Quart. Jour. Royal Meteorological Soc.*, vol. 30, No. 131, I gave it the name of *false dew*, which seems to me to answer the purpose.

J. B. COHEN.

1 North Grange Mount,  
Headingley, Leeds.

DR. SIMPSON pronounces that it does neither (NATURE, Oct. 12, p. 578), and there is only one point that I find a difficulty in following in his very clear interpretation of the formation of dew.

"The dew", he says, "is nowhere" until it appears on the surface of objects whereof the temperature has fallen below that of the surrounding air. If that be the only process in the formation of dew, how is hoar frost to be understood? For, says Dr. Simpson, "hoar frost is true frozen dew". Are we to assume (it would be difficult to prove) that the surface temperature of leaves and other objects had fallen below the dew point before the surrounding air fell below the freezing point? Or does a lower temperature of the air cause the moisture in it to be condensed in the form of hoar?

Dew, whether liquid or frozen, lies almost wholly on the upper surface of leaves, etc. It must, therefore, be chiefly derived from the air above such objects, and to that limited extent perhaps the poet may be justified in declaring that—

"Maxwellton braes are bonny  
Where early fa's the dew".

HERBERT MAXWELL.

Monreith, Whauphill,  
Wigtownshire.

I AM sorry that Dr. Cohen thinks I misstated his views: but after comparing his letter (NATURE, Sept. 28, p. 482) and my letter (NATURE, Oct. 12, p. 578) very carefully I cannot see his point. I only referred to Dr. Cohen twice in my letter: in the first case I wrote: "Dr. J. B. Cohen . . . says it does both", while his actual words were: "I think it may be said to do both"; in the second case I wrote: "Both Sir Herbert Maxwell and Dr. Cohen speak of the water vapour first condensing in the air before appearing as dew"; Dr. Cohen actually wrote: "The cold air tends to cool the objects with which it is in contact and the water vapour present in the warmer air is thereby condensed. Mist over water and marshy ground is formed in this way and this dew may therefore be said to fall". I wish to be helpful in this correspondence, and if Dr. Cohen will be good enough to say in what particular he cannot accept my explanation of dew formation, I will do my best to elucidate the point.

From Sir Herbert Maxwell's letter and a personal letter I have received from Dr. Leonard Hawkes, it appears that my phrase "hoar frost is true frozen dew" has led to misconception. Taken alone it might be read to mean "hoar frost is dew which has been frozen", but when read as part of the sentence in which it appears this reading should be impossible. Still it would have been better to have avoided the ambiguous wording. Sir Herbert Maxwell's difficulty, however, does not appear to be concerned entirely with my wording. I should, therefore, like to amplify my previous letter.

In the process of the formation of dew or hoar frost we are not directly concerned with the temperature of the air; the only two temperatures which come into play are the temperature of the cooling body (say a blade of grass, to fix the attention) and the temperature of the dew point of the air. When the temperature of the blade of grass falls below the dew point owing to radiation, condensation takes place on its surface, and if the dew point is below the freezing point the product of condensation is ice—even though the air temperature is above the freezing point, as it may well be. Ice formed in this way is hoar frost.

When mist forms in air below the freezing point, the mist particles remain liquid, but super-cooled,