straight line; the data given by Pauling seem to prove it.

With regard to the very interesting work of Lindemann and Thiele, it seems that the parachor measurements do not give a definitive structural proof,⁴ because in the series of the aliphatic diazo-compounds very closely related to the azides there is a discrepancy between the parachor measurements and the chemical evidence. The former evidence⁵ is in favour of the cyclic structure, but such a structure is unable to account for the existence of optically active diazo-compounds.⁶ Also, the assumption of an equilibrium between the cyclic and the open-chained molecules is not in harmony with the observed optical properties of the compounds cited.⁷

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¹ NATURE, 128, 639, Oct. 10, 1931.

² Ber., 61, 1529; 1928.

³ Zeit. physik. Chem. (B) 8, 326; 1930. Jour. Am. Chem. Soc., 47, 2904; 1925.

⁴ E. Bergmann, L. Engel, and Stefan Sándor, Zeit. physik. Chem. (B) 10, 403; 1930.

⁵ Lindemann, Wolter, and Groger, Ber., 63, 702; 1930. Lindemann, Ber., 63, 1246; 1930. Compare Sidgwick, Jour. Chem. Soc., 1108; 1929.

⁶ Levene and Mikeska, Jour. Biol. Chem., 45, 592; 1920: 52, 485; 1922: 55, 795; 1923. Noyes and co-workers, Jour. Am. Chem. Soc., 44, 1798; 1922: 48, 2404; 1926.

⁷ Compare K.v. Auwers, Ber., 63, 1242; 1930.

A Two-Dimensional Space Lattice?

AFTER reading the letter from Dr. R. C. Menzies in NATURE of Nov. 28, I wrote to him stating what I believe to be the cause of the orientation of the growing crystals at the liquid surface, and it is at his suggestion (letter dated Nov. 30) that I submit this note for publication.

The explanation probably lies in the convection currents set up by the growing crystals. When a crystal is floating by surface tension forces at the surface of the solution, some of the molecules of solute in the neighbourhood will be deposited on the crystal and this will decrease the density of the solution in the immediate vicinity. The crystals are thus centres of local rising currents and will therefore mutually repel each other, since the currents must spread out sideways on reaching the liquid surface. Crystals of the same size will exert the same lateral forces and must take up the close-packed hexagonal arrangement shown in the photograph. Larger crystals may be expected to exert greater forces than smaller ones, so that a swarm of large crystals will have a greater spacing than a swarm of smaller crystals when both swarms are floating in the same liquid surface; this is very apparent in a second photograph sent to me by Dr. Menzies. The effect may break up owing to (a) the sinking of the crystals, (b) the crystals growing sufficiently large to touch and unite, or (c) as Dr. Menzies has pointed out to me, the reaching of equilibrium between crystals and solution, when the surface currents must cease.

I have noticed the same structure in the crystallisation of a number of organic compounds, though in a much less perfect form. Substances which readily separate from hot solution in compact crystals usually give the lattice effect to a greater or lesser degree, though failing spontaneous crystallisation it is necessary to drop a little of the finely powdered substance on the surface. The phenomenon is shown somewhat feebly by 4-nitropyrogallol 1:2-dimethyl ether crystallising from alcohol, and by 4-iodopyrogallol trimethyl ether separating from light petroleum.

Undoubtedly the spontaneous crystallisation and great density of the thallium derivative are responsible for the unique perfection of the case described by Dr. Menzies.

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The Tertiary Wall of Wood Fibres.

IN addition to the primary and secondary walls of the fibres of the secondary xylem of angiosperms, a third inner wall is not infrequently present. This layer is commonly known as the tertiary wall, and so far little is known of its exact nature or function. The distribution of the tertiary fibre walls in trees suggests, however, that their formation is influenced by environmental conditions, and may therefore admit of a certain amount of control.

A recent study of the occurrence of tertiary fibre walls in the wood of elm¹ led to the conclusion that these layers add to the specific gravity of wood without contributing a proportional increase to its mechanical strength. A study of the moisture relations of wood the fibres of which contain tertiary walls was undertaken to examine the commonly quoted statement that these structures influence the hygroscopicity of wood and "prevent undue shrinking and swelling".² Fifteen carefully matched pairs of wood specimens from several trees of *Robinia Pseudacacia* L. and of *Ulmus campestris* L. were selected, so that tertiary fibre walls were present in one member of each pair and absent from the other. Comparison of these samples revealed no difference in behaviour that could be attributed to the presence of tertiary fibre walls, either in the total shrinkage of the wood from the green to the oven-dry condition or within any shorter intermediate range of moisture content. It is true that the shrinkage of the wood of *Robinia Pseudacacia* is somewhat less than might be expected from its structure, but the reason must be sought in other features than the presence of tertiary fibre walls.

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¹ "Home-grown Timbers, their Anatomical Structure and its Relation to Physical Properties: Elm." (Forest Products Research Bulletin No. 7. 1930.)

² E. C. Jeffrey, "The Anatomy of Woody Plants". (University of Chicago Press, 1917, p. 34.)

Turbulence in a River.

IN the river Cam, in its normal state, the conditions correspond to an eddy viscosity of the order of 1000 cm.²/sec. It therefore seemed remarkable that in my work on the formation of surface waves by wind¹ the conditions for formation were the same in the river as on a pond.

It occurred to me that the uppermost layer in the river might actually be non-turbulent; and when this possibility was tested by dropping ink into the river it was verified. The drops spread out merely as in still water until they reached a depth of 10 cm. or so and were then torn apart by eddies.

It appears, therefore, that the stabilising influence of gravity prevents eddy motion from reaching the free surface. The formation of waves produced by a light wind, with lengths of 8-10 cm., is therefore controlled by ordinary viscosity and not by turbulence.

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¹ Proc. Roy. Soc., A, 107, 189-206; 1925.