In view of the great importance of water vapour in all volcanic phenomena, it was thought desirable to direct attention to this method of estimating the activity of solfataric and volcanic areas. With suitable instrumental aid, and more time for thorough observations than was available, the method might be used for comparing the activities at different localities and recording changes in the activity of areas under observation at intervals.

STUART H. WILSON.

Dominion Laboratory,
Department of Scientific and
 Industrial Research,
  Wellington, N.Z.

[1] Hochstetter, "Reise der O. F. Novara", Geol. Teil, 1 (Wien, 1864).
[2] Thomas, *Trans. N.Z. Inst.*, 20, 306 (1888).
[3] Köhler, *Geofysiske Publikasjoner*, 5, 1 (1930).

Benzil—a Skew Molecule ?

THE values of the dipole moments of benzil and phenanthraquinone in various solvents, determined by us, and summarized below, suggest that the former molecule has a skew configuration in which the two $C_6H_5-\overset{|}{C}=O$ units lie in planes which are nearly mutually perpendicular (see figure).
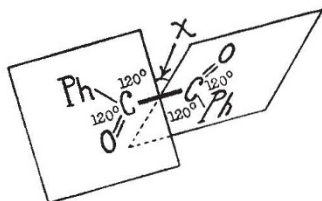
Solvent	Benzil	Phenanthraquinone
n-Hexane	3·4₉ D.	—
Dioxan	3·7₈ D.	5·6₆ D.
Carbon tetrachloride	3·6₆ D.	—
Benzene	3·7₆ D.	5·5₇ D.
Carbon disulphide	3·4₄ D.	5·5₉ D.

This is seen if a certain structural similarity between benzil and phenanthraquinone be assumed, because then the moment of the latter can be taken as that of the completely *cis* form of the former, whence the component moments acting in the directions of the $>C=O$ links are each of 3·2₃ D. magnitude. Knowing this, the effective degree of departure of benzil from a co-planar model can be calculated, since, from symmetry, during rotation of the two benzoyl groups, only those resolutes acting at right angles to the axis of rotation will contribute to the experimentally measured resultant ; therefore—if the two rotatable halves of the molecule are set in planes making an angle $\chi°$ with one another—this resultant is given approximately by $R = 3·2_3 \cos 30 \sqrt{2(1 + \cos \chi)}$, from which values of χ between 90° and 100° are obtained by substitution of the results in the accompanying table.

If this conclusion is correct, benzil is the third molecule for which a 'skew' configuration seems to be necessary, the previous two[1] being hydrogen peroxide and hydrazine. We think that the reasons advanced by Penney and Sutherland[1] for the last cases, however, cannot apply to benzil, which is probably a molecule the shape of which is set by the superposition of electrostatic and steric repulsive forces (tending to produce a *trans*-structure) and van der Waals' attractions (tending to produce a *cis*-structure). In connexion with this point, it is relevant to note that published data[2] show that diacetyl, for which the van der Waals' attractions must be weaker than for benzil, has a definitely greater χ angle (130°–140°).

C. C. CALDWELL.
R. J. W. LE FÈVRE.

University College,
 London, W.C.1.
  April 1.

[1] Penney and Sutherland, *Trans. Faraday Soc.*, 30, 898 (1934).
[2] Zahn, *Phys. Rev.*, 40, 291 (1932).

The Vector Map of the Cyclol C_2 Molecule

THE vector map of a projection of the cyclol structure C_2 prepared by D. P. Riley and I. Fankuchen[1] provides elaborate illustrations of the rudiments of map theory. Particularly is it to be noticed that the weaker of the two peaks in the map is not the projection of a peak which could be observed in an equally coarse vector map of the skeleton in three dimensions. In this respect, the diagram illustrates a distinction between dominant features of a crude map and precise details of a complete map : in a complete map of a projection, every point against which there is an entry is necessarily the projection of some point in space against which there is an entry in the complete three-dimensional map.

If vector maps are to be utilized in science, care must be taken that the assurance proper to the realization that the nature of the relation between a point structure and its vector map is a problem in pure mathematics is not transferred to assertions which have no mathematical basis. When Riley and Fankuchen say that their projection "could reasonably be expected to bear some resemblance to that due to the whole molecule", I can only point out, by way of warning, that if the four triangular faces of the C_2 skeleton were omitted, much more than one third of the skeleton would remain, but the peaks of Riley and Fankuchen's own map would no longer emerge.

Again, there are no mathematical grounds for the statement by Riley and Fankuchen that side-chains roughly perpendicular to the plane of projection "cannot alter the fundamental pattern of the vector map". Even a few side-chains perpendicular to the plane can easily alter the intensity of every entry and therewith alter the shape of every contour and destroy or create recognizable peaks.

I am not, of course, presuming to suggest that Riley and Fankuchen's expectations may not be justifiable somehow for the particular case with which they are dealing, or to deny that when the structure of insulin is known the effect of the side-chains in the vector map may turn out to be as slight as the writers affirm. I am concerned only to protest, in view of the setting in which they have been displayed, that neither expectation nor affirmation can claim the support of general mathematical theory.

E. H. NEVILLE.

University of Reading.
 April 15.

[1] NATURE, 143, 648 (1939).