

collected and exposed as usual. It was discovered that fractions distilling between 158° and 184° C. attracted the largest number of flies, while those distilling below 158° C. proved to be least attractive.

In almost all cases of chemotropic responses of insects, males have been attracted in much larger numbers than the females, which reduces the value of these methods as a control measure. [Compare *Dacus zonatus* to citronella oil, 3 females to 1,000 males (Howlett<sup>1</sup>); *Ceratitis capitata* to kerosine oil, 3 females to 1,000 males (Severin and Severin<sup>2</sup>); *Swammerdamella* sp. to cinnamic alcohol, one female to 40 males (Morgan and Crumb<sup>3</sup>).] In the case of this chironomid, however, it is interesting to note that the females were attracted in a very great majority and constituted 91.2 per cent of all the individuals captured.

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Feb. 6.

- <sup>1</sup> *Sydney Morning Herald*, 645; 1907.  
<sup>2</sup> *J. Agr. Western Australia*, 15, 244-245; 1907.  
<sup>3</sup> *Bd. Agr. Forestry Circ.*, 3, 1-7; 1912.  
<sup>4</sup> *J. Econ. Ent.*, 6, 347-351; 1913.  
<sup>5</sup> *J. Econ. Ent.*, 8, 329-338; 1915.  
<sup>6</sup> *Ann. Ap. Biol.*, 6, 269-290; 1920.  
<sup>7</sup> *J. Econ. Ent.*, 21, 913-920; 1928.  
<sup>8</sup> *J. Econ. Ent.*, 5, 400-402; 1912.  
<sup>9</sup> *Trans. Ent. Soc. Lond.*, 412-418; 1912.

#### Nicotine Spray for the Apple Sawfly

In some preliminary experiments carried out here in 1933 by G. L. Hey and myself, it was found that the egg of the apple sawfly, *Hoplocampa testudinea*, Klug., can be killed by means of a spray containing 0.05 per cent nicotine and 0.5 per cent commercial soft soap.

It has for some time been thought that the egg of this insect is susceptible to such a spray only shortly before eclosion, that is, after the rupture of the chorion. Our experiments, however, show that the egg is vulnerable right from the time it is laid.

The detailed results of these experiments, and a discussion of their practical implications, will appear in the next issue of this Station's "Annual Report".

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#### Mechanism of Detonation in Lead Azide Crystals

GARNER and Gomm<sup>1</sup> and also Muraour<sup>2</sup> have distinguished between the energies of activation (critical increments) which characterise (a) the thermal decomposition and (b) the detonation of an explosive. In the case of lead azide, the value<sup>1</sup> for the detonation, 150,000 cal./mol. (one extreme measurement, 9.7 sec., is omitted advisedly and with Prof. Garner's concurrence), is about three times that for the thermal decomposition, 47,000 cal./mol.

The crystalline structure has also been examined. As determined by Miles<sup>3</sup>, the unit cell contains twelve molecules of PbN<sub>6</sub>. In this department, however, the radiological directorate<sup>4</sup> has examined lead azide in more detail; the *c*-axis of Miles is doubled, giving the cell twenty-four molecules, and the space group is found to be  $Q_{\frac{1}{2}}$ . It follows

from this that these twenty-four molecules are arranged in eight groups each containing three molecules of PbN<sub>6</sub>.

The recurrence of the value three is evidence that the criterion for detonation is closely related to the crystalline structure, and would indicate that the thermal decomposition is caused by the activation of a single molecule of PbN<sub>6</sub>, whereas the detonation requires the simultaneous activation of all three constituents of one of the complex groupings (PbN<sub>6</sub>)<sub>3</sub>.

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- <sup>1</sup> Garner and Gomm, *J. Chem. Soc.*, 2123; 1931.  
<sup>2</sup> Muraour, *Chem. et Ind.*, 20, 39; 1933.  
<sup>3</sup> Miles, *J. Chem. Soc.*, 2532; 1931.  
<sup>4</sup> Unpublished.

#### Vapour Pressure of Potassium Amalgams

If a solution of a substance has a smaller surface tension than the pure solvent, the solute is adsorbed or concentrated at the surface, in accordance with Gibbs's theorem. It is therefore to be expected that the vapour pressure of the solvent of such a solution will be higher, when the concentration of the solute is made the same in the surface as in the interior, by continually renewing the surface, than when it is not.

The following facts, found by measuring the vapour pressure of mercury over potassium amalgams, by determining the absorption of the resonance line 2537 Å. at room temperature seem to confirm this conclusion:

Diluted potassium amalgams show a much greater lowering of the vapour pressure of the mercury than would correspond with Raoult's law (an amalgam containing 1.5 atom per cent of potassium showed 30 per cent lowering of the vapour pressure). If, by careful motion, the surface is continually renewed, the vapour pressure rises almost to the value predicted by Raoult's law. Soon after the motion is stopped, the vapour pressure returns to the former low value.

The same phenomenon is caused by impurities in mercury which is not especially cleaned.

The above results explain Pohl and Pringsheim's observations<sup>1</sup> on the very small dependence of the sensibility and threshold of the photo effect of potassium amalgams on the concentration.

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- <sup>1</sup> R. Pohl and P. Pringsheim, *Verh. Deutsch. Phys. Ges.*, 15, 431, 1913.

#### Influence of Pressure on the Spontaneous Inflammation of Hydrocarbons

MESSRS. NEUMANN AND ESTROVICH have recorded<sup>1</sup> some experiments on the conditions of spontaneous inflammation of the mixture C<sub>5</sub>H<sub>12</sub> + 8 O<sub>2</sub> when heated in an iron bomb and in a bomb the inner surface of which was covered with gold. The peculiar relation which they find between pressure and ignition-temperature also appears in some unpublished work of the late H. B. Dixon.