In our theoretical paper we stated that the general dynamical relations which we then foresaw and have since confirmed, would apply not only to the decompositions of organic cations but also to the analogous reactions of neutral molecules; for example, the hydrolysis (reagent OH^-), alcoholysis (reagent $OAlk^-$), phenolysis (reagent OPh^-), aminolysis (reagent NR_3), etc., of alkyl halides. In hydrolysis, for example,

$$AlkCl + OH^- \rightarrow Alk.OH + Cl^- \quad . \quad . \quad . \quad . \quad (B\,2)$$

$$\left.\begin{array}{l} AlkCl \rightarrow Alk^+ + Cl^- \text{ followed by} \\ Alk^+ + OH^- \rightarrow Alk.OH \text{ (instantaneous)} \end{array}\right\} . \quad (B\,1)$$

the changes of mechanism, $B\,2 \rightarrow B\,1$, characteristic of the above aralphyl and alphyl series should again appear. That this is true for the aralphyl series has become clear from a comparison of Grant and Hinshelwood's recent work on ethyl chloride[4] with the earlier work of Ward[5] and of Norris and Morton[6] on benzhydryl chloride. Concerning the alphyl series, the indication that methyl and tertiary alkyl halides are more reactive than primary and secondary alkyl halides has long been available[7], and one of us has now proved that, in contrast to the bimolecular hydrolysis of ethyl chloride[8], the hydrolysis of *tert.*-butyl chloride is unimolecular, the velocity being the same in alkaline and in acid solution. In accordance with mechanism *B* 1, these experiments are regarded as measuring the velocity of ionisation of *tert.*-butyl chloride.

Other analogous reactions (phenolysis, aminolysis, etc.) are being examined, and in view of the interest attached to critical energies of ionisation, the attempt is being made to trace their dependence on the nature and existence of the solvent through study of such unimolecular reactions as have been illustrated.

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[1] *J. Chem. Soc.*, 526; 1933.
[2] Cf. von Halban, *Z. physikal. Chem.*, **67**, 129; 1909.
[3] *J. Chem. Soc.*, 69, 75; 1933.
[4] *ibid.*, 258; 1933.
[5] *ibid.*, 2285; 1927.
[6] *J. Amer. Chem. Soc.*, **50**, 1795; 1928.
[7] Compare especially Segaller's experiments on phenolysis, *J. Chem. Soc.*, **103**, 1154, 1421; 1913.
[8] Grant and Hinshelwood, *loc. cit.*

Biological Races in *Psyllia mali*, Schmidberger

THE apple-sucker, a serious pest of orchards, has long been known to breed on species of *Pyrus*, chiefly *P. malus*, and has been reported to occur on hawthorn, though definite record of its breeding on this plant is lacking. My observations on the biology of Scottish Psyllidæ (Hemiptera-Homoptera) have shown that in south-east Scotland *Psyllia mali* regularly breeds on various species of *Crataegus* and is, in fact, identical with, and only a seasonal form of, *Psyllia peregrina*, Först, recorded from hawthorn. The nymphs of these insects on hawthorn, however, differ slightly from those of the apple-sucker, and this fact, coupled with their habit of being confined to different host genera, has been probably responsible for the two specific names under which they have been so far known.

Careful examination of adult psyllids from hawthorn and apple has shown them to be morphologically indistinguishable, except as regards inconstant differences of size, the hawthorn insect being often less robust than the apple one, so that the case for segregating them as two species disappears unless differences of host plants and immature stages (to a slight degree) may be considered sufficient criteria of specific separation. It is worthy of note, in this connexion, that Sulc[1] at least regarded *P. mali* and *P. peregrina* as synonymous. At the same time, these insects do not mate with each other, nor can they be induced to oviposit on each other's host plants. I have, therefore, felt justified in calling them two biological races of the apple-sucker: *P. mali* race *crataegi* bred on hawthorn and *P. mali* race *mali* bred on apple.

An interesting fact, in this connexion, is that while the hawthorn race is attacked by many Chalcidoid and Proctotrypoid parasites, the apple race is free from them. The only parasite common to both is a new species of *Endopsylla*[2] (Cecidomyidæ-Diptera) which oviposits on the wings of the adults, the larvæ burrowing into the abdomen of the host. The incidence of parasitism is much greater in the hawthorn race than in the apple-sucker. Fuller accounts of the question of biological races in *Psyllia mali* and of the biology of its Cecidomyid parasite will be published shortly.

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[1] Vide his synonymy of *P. mali*, cited by Speyer, W., in "Der Apfelblattsauger", 1929. Berlin.
[2] This species, which was reared by me, is being described by Dr. H. F. Barnes of the Rothamsted Experimental Station.

Quantity of Meteoric Accretion

IN ordinary circumstances, about three meteors are visible per hour at a given place. Such average meteors are visible at a distance of at least 100 km., and their mass seems to be in the neighbourhood of 6×10^{-3} gm.[1]. Thus the mass falling per hour on an area of order 3×10^{14} cm.^{2} is about 2×10^{-2} gm.; or 6×10^{-17} gm. per square centimetre. Taking the density as 3, we find that the rate of accumulation is 2×10^{-17} cm. thickness per hour or 2×10^{-5} cm. in 100 million years.

This result seems surprisingly small, but Lindemann and Dobson's result and the estimate of distance can scarcely be seriously out. It will be increased in the meteoric showers, but they do not occupy enough of the time more than to double the estimate. It follows that the amount of meteoric accumulation is so small as to be imperceptible even over periods comparable with the age of the earth.

As there are occasional published references to meteoric dust found in snow in the Alps and in polar regions, I have consulted a number of observers, who are all inclined to think that the dust found is of terrestrial origin and has been transported by wind. The smallness of meteoric accumulation would explain why the bright streaks on the moon, which are too shallow to cast a shadow, have failed to become buried and rendered invisible.

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[1] Lindemann and Dobson, *Proc. Roy. Soc.*, A, **102**, 419; 1922.