

very different from that of the perchloric ion, being a point-symmetrical one; only the binding forces are greater. Furthermore, the fact that the strongest line of the perchloric ion ( $\Delta\nu = 922 \text{ cm.}^{-1}$ ) persists even in the pure acid, suggests that the formation of an acidium salt is real, though the lines due to its cation are failing. In fact, the addition of a proton to the acid molecule changes but little the vibrating masses, and probably causes only a slight shift of some of the lines towards lower frequencies. The broadening and shifting of line  $730 \text{ cm.}^{-1}$  is perhaps due to the disappearance of the complex cation.

In connexion with the presence of an acidium salt, the associated molecules give rise to a vibration of low frequency ( $\Delta\nu = 422 \text{ cm.}^{-1}$ ). Owing to the weakness of this line and to the great fluidity of pure perchloric acid, this association cannot be very strong. In presence of water, the association diminishes,

while the acidium salt disappears. When both an acid and a water molecule are present, the following molecules and ions exist side by side:



Consequently, the hydronium salt is not a homogeneous one. Even in solutions containing 1.6  $\text{H}_2\text{O}$  molecules, there exist undissociated acid molecules. We think that this may be the case in solutions of perchloric acid of concentration higher than 72.3 per cent (2 mols.  $\text{H}_2\text{O}$ ). The acid of constant boiling point would have therefore the composition  $[\text{H}(\text{H}_2\text{O})_2]^+[\text{ClO}_4]^-$ .

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<sup>1</sup> *Lieb. Ann.*, 440, 200 (1924).

### Points from Foregoing Letters

EXPERIMENTS by Prof. A. I. Virtanen show that legume nodules excrete more nitrogen compounds in the presence of kaolin, sand or soil than in water cultures. The excretion is helped by the presence of other plants (barley, potatoes). The author considers that the distribution of the nitrogen compounds between the nodule and the external medium is determined by an equilibrium, and the removal of the compounds, either by adsorption on sand, etc., or their utilization by other plants, leads to further secretion. In certain circumstances, potatoes when grown with peas actually acquire more nitrogen compounds than the peas themselves.

Identification of vitamins present in oils by means of special vacuum ('molecular') distillation is reported by Dr. K. Hickman. The amount of vitamin distilled with the oil over a range of temperature follows a typical 'elimination' curve, and the presence of different vitamins or vitamin compounds can be detected by irregularities in the curve. With this method the author finds that vitamin A in cod liver and halibut liver oils exists almost entirely in the form of esters, while vitamin D (in cod liver oil) occurs partly free and partly as a mixture of esters.

Prof. J. Errera and Dr. P. Mollet bring forward evidence to show that the large absorption band at about  $3350 \text{ cm.}^{-1}$  in liquid alcohols is not the fundamental O-H band of the isolated molecule, for it is strongly affected by intermolecular forces. The O-H band of the monomolecule appears in dilute solutions or at higher temperature at  $3640 \text{ cm.}^{-1}$

Curves showing the ultra-violet luminescence of crystals of sodium chloride, normal and deformed, which were exposed to X-rays and then irradiated by visible light, are submitted by Prof. M. Schein and M. L. Katz. The normal crystals emit ultra-violet light of wave-length  $2350 \text{ \AA}$ ., while the deformed crystals give, in addition, ultra-violet light of wave-length  $2950 \text{ \AA}$ ., but of shorter duration. The measurements were carried out by means of photon counters.

L. A. Bashford, Prof. H. V. A. Briscoe and Dr. W. Jevons announce the discovery and analysis of an ultra-violet band system of both  $\text{GeCl}$  and  $\text{GeBr}$ , and find that the lower (presumably the ground) states are electronic doublets (probably  $^2\Pi$ ), separations of

which are of the orders to be expected from analogy with diatomic halides of other Group IV(b) elements. A possible explanation of the non-detection of a similar doubling in the lower state of  $\text{SiBr}$  is suggested. In a subsequent letter the authors state that they have observed this doubling in new  $\text{SiBr}$  spectrograms.

Measurements of the polarization of the Raman spectrum lines of silicichloroform,  $\text{HSiCl}_3$ , carried out by Prof. M. de Hemptinne and J. Wouters, indicate that the pyramidal arrangement of the  $\text{SiCl}_3$  group of atoms, though not perfect, is more regular than that of the  $\text{CCl}_3$  group in chloroform.

Reverting to the controversy around natural selection, Prof. E. W. MacBride states that it cannot explain evolution because ordinary random variations are not inheritable. Further, he considers that mutations can never be beneficial, but lead to loss of viability and consequently cannot produce new races. Prof. MacBride sees the solution of the evolution problem in the heritability of long-continued acquired habit, which, he states, has been amply demonstrated.

G. H. Locket supplies additional instances of spiders failing to regenerate lost limbs and feelers. He refers to opinions of previous investigators concerning the factors which may influence regeneration or the lack of it.

Sister Carmela Hayes reports observations on the common stick insect (*Carausius*) which show that these insects eat cellulose (in the form of calico) even when sufficient food, in the form of ivy leaves, is available.

Diagrams showing the Raman spectra of perchloric acid, pure and in various aqueous dilutions, also of saturated solutions of lithium and sodium perchlorates, are given by R. Fonteyne. From the identity of the lines produced by the salt solutions and solutions of the free acid up to seventy per cent concentration, and their similarity with those of pure perchloric acid, the author concludes that the structure of the perchloric acid molecule cannot be very different from that of the perchloric ion. He considers that when both acid and water are present, then  $(\text{HOCIO}_3)_2$ ,  $\text{HOCIO}_3$  and  $\text{ClO}_4^-$  exist side by side.