(1) Yellow-green R_2 heads :—

$\nu_{heads}=$
$$18871{\cdot}0+[672{\cdot}38\,(v'+\tfrac{1}{2})-5{\cdot}14\,(v'+\tfrac{1}{2})^2]-[694{\cdot}29\,(v''+\tfrac{1}{2})-4{\cdot}96\,(v''+\tfrac{1}{2})^2].$$

(2) Orange Q_2 heads :—

$\nu_{heads}=$
$$16558{\cdot}3+[734{\cdot}36\,(v'+\tfrac{1}{2})-5{\cdot}74\,(v'+\tfrac{1}{2})^2]-[698{\cdot}34\,(v''+\tfrac{1}{2})-5.36\,(v''+\tfrac{1}{2})^2].$$

The yellow-green system is evidently due to the transition $^2\Sigma\rightarrow{}^2\Sigma$ and the orange to $^2\pi\rightarrow{}^2\Sigma$. The final level $^2\Sigma$ of both the systems appears to be the same though the frequencies of vibration and the anharmonic factors are slightly different. This discrepancy which has also been observed in the case of alkaline earth halides is probably due as Johnson* and Harvey† have pointed out, to the heads being formed at large J values and the distance $\nu_h-\nu_0$ being not constant throughout the system. The dissociation energies derived from these equations favour the following interpretation of the structure of the molecule :—

Cd (5s 5p ^{3}P)+F (2p^5 ^{2}P)=CdF $^2\Sigma$ ground level.

Cd (5s 6s ^{3}S)+F (2p^5 ^{2}P)=CdF $^2\pi$ and $^2\Sigma$ excited.

Details will be published elsewhere.

R. K. ASUNDI.
R. SAMUEL.
M. ZAKI UDDIN.

Department of Physics,
Muslim University,
Aligarh,
April 10, 1934.

* *Proc. Roy. Soc.*, **A 122**, p. 161 (1929).

† *Proc. Roy. Soc.*, **A 133**, p. 336 (1931).

On the Laws of Spreading of Liquid Drops on Filter Paper.

A LARGE number of experiments with various organic liquids such as alcohols, etc., and water has been recently made in this laboratory to discover the law or laws which govern the spreading of a single drop of the liquid on a filter paper. To prevent the effect of evaporation of the spreading drop, observations are made in a closed chamber kept saturated with the vapour of the liquid.

The liquids, so far studied, show that the velocity of spreading dies down according to two distinct exponential laws which may be put in the forms :—

$$V_d = V_0\, e^{-\lambda_1 d} \quad \ldots \quad (1)$$

$$v_d = v_0\, e^{-\lambda_2 d} \quad \ldots \quad (2)$$

The second law becomes operative as soon as the influence of the first has disappeared.

A dimensional analysis of λ_1 and λ_2 leads to the following results, namely,

$$\lambda_1 = \frac{C_1}{A}\cdot\frac{(MT)^{1/2}}{\eta} \text{ and } \lambda_2 = \frac{C_2}{v_c}\cdot\left(\frac{T}{M}\right)^{1/2}$$

where M is the mass of the drop; T the surface tension of the liquid: η the coefficient of viscosity; C_1 and C_2 are two pure numerics and A is the area of the filter paper wetted by the liquid until equation (1) holds and v_c is the critical velocity at the distance at which transition from law (1) to law (2) takes place. The critical velocity has been found to be a very definite constant for a given pure liquid, independent of the mass of the drop taken. The results observed completely verify the laws given above.

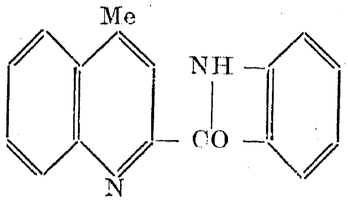
Further work on solutions of different electrolytes is in progress at present. Full details will be shortly published.

K. PROSAD.
B. N. GHOSH.

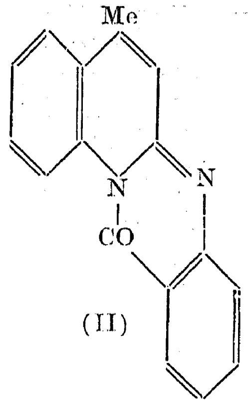
Physics Department,
Science College,
Patna,
April 13, 1934.

The Condensation of 2-Chlorolepidine with Anthranilic Acid.

EPHRAIM (*Ber.*, 1892, **25**, 2710) condensed anthranilic acid with 2-chlorolepidine in absence of any solvent and suggested an anthranil structure (I) for the product, on the ground that the substance could be easily hydrolysed by alcoholic potash to an acid. Backeberg (*J. Chem. Soc.*, 1933, p. 390) supports this constitution without adducing fresh reasons, and finds moreover that the product is the same even when such solvents as nitrobenzene or acetic acid are employed (*cf.* E.P. 321738). Recently the present author in collaboration with Mr. D. C. Sen (*J. Chem. Soc.*, 1931, p. 2840) has studied the condensation of 2- and 4-chloroquinolines with anthranilic acid and has ascribed the general structure (II) to the products obtained



(I)



(II)

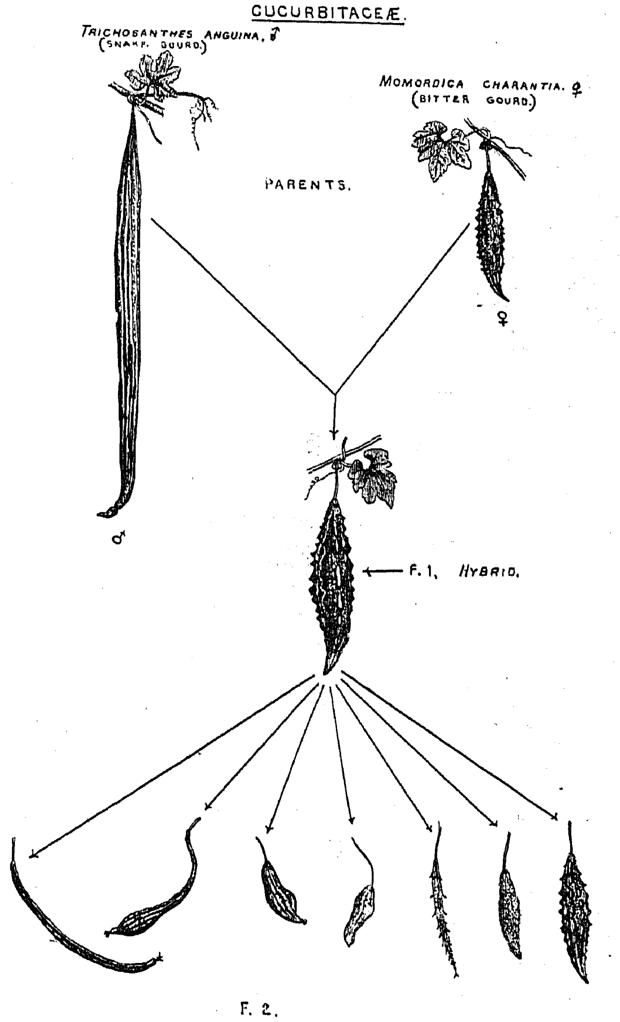
from anthranilic acid and 2-chlorolepidine. The fact, recorded by Backeberg, that 2-chlorolepidine condenses with anthranilic acid in acetic acid solution supports our view of the mechanism of condensation, inasmuch as anthranil formation does not take place easily. It is also difficult to explain the absence of any anthranil in the condensation of anthranilic acid with 4-chloroquinoline, if the views of Ephraim and of Backeberg be correct. Our arguments have already been put forth and they need not be repeated here. Incidentally it might be pointed out that 4-*o*-carboxyphenylamino-quinaldine and 2-*o*-carboxyphenylamino-lepidine have been previously described by us—a fact which has apparently been overlooked by Backeberg.

P. K. BOSE.
University College of Science,
Calcutta,
April 20, 1934.

Intergeneric Cross in Cucurbitaceæ.

AT the instance of the Director of Agriculture, Madras, a number of both interspecific and intergeneric crosses have been attempted in cucurbitaceæ. In very many cases, there was no development of fruit.

In one case, however, that between bitter gourd (*Memordica Charantia* ♀) and snake gourd (*Trichosanthes anguina* ♂) over 50% of the artificially pollinated flowers have developed into fruit, the seed of which, when sown, germinated well and produced a normal crop. Reciprocal crosses in these have also been attempted but without success. The seed obtained was sown with over 50% germination and the tender plants were healthy even from the beginning. Except that the plants were more vigorous than the female parent, all the floral and vegetative characters of the bitter gourd were dominant while those of the snake gourd were recessive. The F_1 plants were fully fertile as the fruits which were slightly bigger in size than those of the parent contained fully developed seeds. The seed when sown in the second filial generation germinated well but a large percentage of the seedlings were washed away by floods. The surviving plants came up fairly well after a certain amount of tardy growth in the early



stages and are now bearing fruit. The F_2 segregation has produced interesting combinations—there being gradations not only in form and size of fruit but also in taste. It is too early to say anything more at present and the results of detailed study will be published in due course.

S. SITARAMA PATRUDU.
P. KRISTNA MURTI.
Agricultural Research Station,
Anakapalli.
April 20, 1934.