weights" have been calculated, but presumably the ordinary formula has been employed. It is important to note that in seven out of the nine boiling-point measurements carried out with magnesium sulphate, the concentration of the solution varies from about 15 per cent. to over 40 per cent. In other experiments with solutions of cane sugar, concentrations varying from 20 grams to 290 grams of sugar per 100 grams of water have been employed, the calculated "molecular weight" (theory = 342) decreasing from 360 to 212 at the highest concentration.

To attribute to the numbers calculated by means of the simple boiling-point formula for solutions of such concentrations the significance of molecular weight values can scarcely be regarded as justifiable. In so far as the ordinary freezing-point and boiling-point formulæ rest on a thermodynamical basis, they only hold good for ideal solutions; for such solutions the formulæ in question will give molecular weight values, but it has yet to be shown that the numbers calculated by Kahlenberg from his experiments can be taken as representing molecular weights.

For moderately concentrated solutions which no longer satisfy the requisites of an ideal solution, distinguished by the properties that no heat is evolved or absorbed and no change of volume takes place when it is diluted, Ewan, amongst others, has deduced an expression connecting the osmotic pressure with the lowering of the freezing point, the formula resting on a thermodynamical basis. This formula, when used for the calculation of molecular weights, gives, even with solutions containing as much as 40 per cent. of cane sugar, values scarcely differing from theory (342), whereas the simple freezing-point formula for a solution of the concentration mentioned gives 275.

Another reason advanced by Kahlenberg to prove the inadmissibility of the ionic theory is the lack of agreement between the numbers representing the degree of dissociation as calculated from the conductivity on the one hand and the freezing- or boiling point on the other. If for the reasons previously stated the calculations based on the boiling-point and freezing-point measurements have little significance so far as the ionic theory is concerned, it is obviously impossible to effect the required comparison. Furthermore, it seems questionable whether the numbers calculated by the formula $\alpha = \frac{\mu_v}{\mu_\infty}$ really represent degrees of dissociation. The formula involves the as yet unproved and scarcely probable assumption that the ionic velocities are the same in solutions of all possible concentrations. The development of the ionic theory is by no means conditioned by the validity of such a formula. So far as Kahlenberg's measurements are concerned, the comparison between the results of the boiling-point and conductivity measurements is moreover, impossible, except in the case of the binary salts, since the range of concentrations employed is quite different.

Although, therefore, the publication contains a large number of valuable empirical data, yet it cannot be allowed for one moment that the ionic theory has been shown to be untenable. It is far from the wish of the writer to minimise the difficulties which do admittedly confront the theory of electrolytic dissociation. It must not, however, be supposed that the theory has received its final and complete form; the possibilities of its rational expansion and development to explain existing irregularities are far from being exhausted. A warning note may be sounded against a too ready assumption that new experimental data prove the untenability of the theory without very careful consideration of what exactly is, and is not, stipulated by the theory.

H. M. DAWSON.

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Birds attacking Butterflies and Moths.

I WAS much interested in the letter in NATURE of January 16 on the frequent capture of butterflies in India by the King Crow, as some years ago I experimented with a captive bird of this species, and found that it avoided "warningly-coloured" butterflies when possible, and was deceived by mimicry (*J. A. S. B.*, ii. 1897, p. 651).

With regard to the capture of butterflies by bush-haunting birds which do not take them on the wing, I pointed out as long ago as 1895 (*J. A. S. B.*, ii. 344) that the common Babbler *Crateropus canorus* was likely to meet with butterflies in repose, and proved experimentally that it dislikes the "warningly-coloured" species. But I could then give no positive evidence that it does, as a matter of fact, attack butterflies on its own account, though it will take them if thrown in its way.

I therefore give here the results of a few experiments which, in my opinion, show that this bird also naturally preys on butterflies.

In March last year I gave to a wild-caught bird of this species a *Danais limniace* together with a Junonia. The bird took and ate the latter; I then removed the Danais.

I have just now been offering three specimens of *Danais genutia*, together with three plain brown butterflies, to three wild-caught adult Babblers placed in separate cages.

Two of the birds disregarded the Danaids until they had eaten the other butterflies, and then did not attack them eagerly or eat them (except the abdomen in one case), although they had no food in their cages at the time.

I conclude, therefore, that they were last year's birds, which knew and disliked *D. limniace*, and the present two *D. genutia*, from previous experience in catching and tasting butterflies when wild.

The third bird experimented with to-day attacked its specimen of *D. genutia* first, but soon left it to eat the other butterfly given; nor did it tear the Danais to pieces as did the others, although, like them, it had no other food in its cage.

Either, then, this bird had forgotten its wild experience, or, what is more likely, it had never happened to catch *D. genutia*, and so knew nothing about this species, which it evidently disliked, from what has been said above, although it was not impressed by the "warning colours."

In my previous experiments with this Babbler I did not observe the same precautions, when *first* offering the butterflies to the birds, as I did in these later experiments, so that the results I obtained, although sufficiently demonstrative of the preferences of the species, threw no light on the individual experience of the specimens experimented with.

F. FINN.

Indian Museum, Calcutta, February 6.

SI cela peut intéresser vos lecteurs: . . . dans une traversée de la Mer des Caraïbes sur le steam. angl. *Mariner*, en Mai, 1886, nous fûmes, par un temps calme, assaillis par un grand nombre de tout petits oiseaux, bien qu'à une assez grande distance de la terre, invisible. Ils poursuivaient de petits papillons qu'ils venaient happer au vol jusques sur mes genoux. J'étais assis très fatigué et un peu inerte sur la dunette. Je ne pouvais songer à déterminer oiseaux ni insectes. Les matelots laissaient faire. La brise fraîchit et tout ce petit monde disparut en un clin d'œil. Que sont-ils devenus?

AD. NICOLAS.

Angers (M.-et-L.), le 22 Février.

On Prof. Arrhenius' Theory of Cometary Tails and Auroræ.

IN the more or less popular accounts which have recently been given of Prof. Arrhenius' theory of cometary tails and the auroræ, it is generally stated that the smaller the diameter of the corpuscle upon which the light is falling the greater the excess of light-pressure over gravitational force. This explanation, however, holds only so long as the diameter is greater than the wave-length of light. If the diameter becomes of the same order as the wave-length, the ratio between light-pressure and gravitation follows an entirely different law. This has recently been demonstrated by Prof. Schwarzschild by an exhaustive mathematical treatment of the question in a paper entitled "Der Druck des Lichtes auf kleine Kugeln und die Arrhenius'sche Theorie der Cometenschweife" (*Sitzungsberichte* der k. b. Academie der Wissenschaften zu München, 1901, Heft iii.). The conclusions arrived at in this paper are of considerable importance in so far as they show that the effect of gravitation is exceeded by that of the pressure of light only so long as the diameter of the corpuscle is greater than about $0{\cdot}07\mu$. For this limiting value the two forces are exactly balanced; but for smaller values of the diameter the light-pressure becomes rapidly less, so that it is then always exceeded by gravitation. It would appear from Prof. Schwarzschild's computations that the globular corpuscles thrown off in the tails of comets should have diameters not smaller than $0{\cdot}07\mu$ and not exceeding $1{\cdot}5\mu$, supposing the specific gravity of the corpuscle to be that of water. Now these values far exceed the limits assigned to the dimensions of the molecules. According to our present knowledge, based on

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