and the chemical activity of ions and non-ionised molecules respectively. Communications on these and other topics were afterwards read and discussed, amongst the contributors or those taking part in the discussion being Arrhenius (the originator of the theory), Acree, McBain, Bousfield, Sand, Partington, Porter, Newbery, Lindemann, Philip, and J. C. Ghosh.

Fundamental differences of opinion with regard to the main problems discussed were very marked. The evidence for the hydration of ions is by some held as final, by others as having only a limited application, and by yet others as quite inconclusive. Most attention was given to the problem of the abnormality of strong electrolytes. At extreme dilutions these electrolytes are regarded by many as behaving normally, the dissociation constant for uni-univalent electrolytes being about 0·02, but owing to the magnitude of the water-correction, and the difficulty of exactly fixing the molar conductivity for infinite dilution, this result must still be looked upon as uncertain. At ordinary dilutions the law has no application, and the most promising explanation is that elaborated by Dr. J. C. Ghosh, who proceeds on the assumption that the strong electrolytes are practically completely ionised in all dilute solutions, but that there is an electrostatic equilibrium between mobile ions, which contribute to the conductivity, etc., and inert ions, which do not. An electrical dilution law is therefore substituted for the chemical mass-action law in the case of strong electrolytes. For weak electrolytes this electrical action would only enter as a negligible disturbing factor of the mass-action law. The further development of this idea may be awaited with interest.

THE SPECIES CONCEPT AMONG FUNGI.

IN the Transactions of the British Mycological Society (vol. vi., part ii., September, 1919) Mr. W. B. Brierley protests against the practice of mycologists in describing as species the forms which are presented to them in Nature or as pathological growths, especially on cultivated plants. The description of new fungal species is based on the assumptions that the distinguishing characters are of a morphological nature, and that the essential specific characters are constant and hereditary and may be determined in one specimen of one generation. But the laboratory and field experience of the experimentalist shows that under changes in the environment the whole structure and facies of the organism may be transformed, while under identical conditions there is considerable evidence that the morphological variation of a particular fungus is definite and constant. The so-called species of the mycologist is comparable with the "ecad" of the ecologist, and is the resultant of the organism and its environment. "Ecads" indistinguishable from each other may be produced from two distinct organisms interacting with one and the same environment, or with two different environments. Two precisely similar fungi growing on a potato and a decaying tree-stump respectively may really be different species, though the systematic mycologist would consider them identical. The true organism is a physiological equilibration, a metabolic entity, the interaction of which with the environment results in the growth-form or "ecad." It follows that the morphological species concept must be given up in favour of the physiological species concept. The only exact method of determining species is by means of quantitative data derived from cultural treatment under standardised physico-chemical conditions, for this method alone reveals the physiological condition of the organism. The author suggests that even the apparently stable forms of the higher fungi, Agarics, Polypores, etc., are merely "ecads," and that two precisely similar morphological entities of, for instance, *Agaricus melleus* may conceal totally different physiological constitutions which under other conditions of growth would diverge characteristically.

Mr. Brierley also attacks another concept of mycology, namely, the "educability" of fungi, or the induction by suitable treatment of permanent modifications in their biochemical, morphological, or other properties. This concept is widely held by microbiologists, but if it implies a possibility of a change in the physiological constitution of an organism, it follows that with fuller knowledge and improved technique a rapid change of one species into another is possible. The author affirms that the condition of knowledge and the available evidence are not such as to warrant an hypothesis so subversive of the foundations of biological science. The presumed mutations may be due to the presence of mixed populations in supposed pure cultures, or merely the expression of a developmental stage previously unrecognised; further, no organism in which sexuality exists or is conceivable must be used unless its gametic constitution and genetic behaviour under all the conditions of the experiment are known.

THE UPPER LIMIT OF UNPLEASANT BEATS.

IT is well known that Helmholtz traced all discordant effects of two or more musical notes when sounded together to the presence of beats occurring between the prime tones, between the prime of one and an upper partial of the other, between the upper partials of each, or to beats occurring in some other way. Further, to produce the unpleasantness in question the beats must lie between certain limits of frequency, which limits vary with the pitch in use.

In this connection it is of interest to note that Mr. Narendranath Chatterjee, of Chittagong, India, has recently given a formula expressing the upper limiting frequency for beats for which the roughness vanishes. This formula he writes as follows:

$$B = \frac{N}{0{\cdot}7 + n + i}, \quad . \quad . \quad . \quad . \quad . \quad (1)$$

where B is the number of beats per second for which the roughness vanishes, N is the frequency of the lower of the two tones sounded simultaneously, n is the number of the musical scale containing N and beginning with 32 per second as the fundamental of the first scale (the octave of this being the fundamental of the next scale, and so on), and, finally, i is the interval between N and the fundamental of the scale in which it is contained.

Thus N, n, and i are connected by the equation

$$N = 32 \times 2^{n-1} \times i \quad . \quad . \quad . \quad . \quad . \quad (2)$$

The results of the law compared well with Mayer's experimental values, as shown in the following table:

Frequency N of lower tone	Frequency B of beats when roughness vanishes	
	Mayer's values	Results of law
64	16	17
128	26	27
256	47	45
512	78	76
1024	135	133