Conclusions.

We have seen that the distribution of small particles in a liquid follows the law

$$e^{-m}\left\{1+m+\frac{m^2}{2!}+\ldots+\frac{m^r}{r!}+\ldots\right\}$$

where m is the mean number of particles per unit volume * and the various terms in the series give the chances that a given unit volume contains 0, 1, 2, ... r, ... particles. We have also seen that this series represents the limit to which any point binomial $(p+q)^n$ approaches when q is small, insomuch that even $(\frac{19}{20}+\frac{1}{20})^{100}\times 1000$ is represented by $e^{-5}\left(1+5+\frac{5^2}{2!}+\ldots+\frac{5^r}{r!}+\ldots\right)\times 1000$ with a maximum error of about 4·5 in 180.

For the rough calculation of odds with n small compared to $\frac{1}{q}$ the exponential series may be used instead of the binomial as being less laborious.

Finally, we have found that the standard deviation of the mean number of particles per unit volume is $\sqrt{\frac{m}{M}}$ where m is the mean number and M the number of unit volumes counted, so that the criterion of whether two solutions contain different numbers of cells is whether m_1-m_2 is significant compared with $\cdot 67449\sqrt{\frac{m_1}{M_1}+\frac{m_2}{M_2}}$.

It must be noted, however, that the probable error will always be greater than that calculated on this formula when for any reason the organisms occur as aggregates of varying size.

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