are formed per second from molecules a and e in a gas is usually written $k_1C_aC_e$, where C_a and C_e denote the concentrations of the molecules a and e, respectively, and k_1 the chance of a molecule a encountering a molecule e in a second. But what happens during an encounter most likely depends on the state of the molecules, which would depend on previous encounters with other molecules, during which they get activated so to speak, or we should write $\varkappa_1 k_1 C_a C_e$ for the number of molecules formed, where $\varkappa_1$ may be called the activation constant, and is the fraction of the encounters at which the molecules were sufficiently activated to form new molecules. Similarly the number of molecules ae breaking up per second is usually written k_2C_{ae}, where C_{ae} denotes the concentration of the molecules ae, and k_2 the chance of a molecule breaking up during a second if left to itself. But this chance may depend on previous encounters with other molecules, or we should write $\varkappa_2 k_2 C_{ae}$ for the number breaking up per second, where $\varkappa_2$ denotes the activation constant. When equilibrium exists

$$\varkappa_2 k_2 C_{ae} = \varkappa_1 k_1 C_a C_e$$

and hence

$$K = \frac{\varkappa_2 k_2}{\varkappa_1 k_1}$$

The quantities k_1 and k_2 depend on the temperature only. Hence unless $\varkappa_2 = \varkappa_1$ the constant of mass action is a function of the volume of the interacting mixture and masses of the constituents, since $\varkappa_1$ and $\varkappa_2$ are functions of these quantities, besides of the temperature.

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VEGETATIVE PROPAGATION OF THE APPLE BY SEED

IN a recent article[1] dealing primarily with chromosome studies, Kobel, of the Swiss Versuchsanstalt für Obst-, Wein- und Gartenbau (Wädenswil), has reported several instances of apparent apogamy in the apple. Using the variety known there as Transparent de Croncels (but which may possibly be Yellow Transparent), several emasculated and bagged flowers have in different years set seeds, some of which have been cytologically examined at various stages of development, while others of these seeds have been grown to bearing trees. The writer of this note saw on the Wädenswil experimental grounds, the 4 seedlings which are now in bearing; their apparent identity with the seed-mother tree, together with the results of Dr. Kobel's cytological studies seem to warrant the conclusion that under certain conditions (not as yet defined), unfertilized ovules of this variety may set viable seeds, genetically constituting true vegetative reproduction. These results differ from the somewhat similar observations by Frost,[2] in that in Citrus the stimulus proceeding from fertilization seems necessary for the production of such "asexual" seeds, while in the apple they may arise entirely without fertilization.

As Kobel points out, the importance of such apogamic seeds as a means of obtaining uniform, clonal rootstocks, should be at once apparent. Although under the conditions of his experiments, Kobel was not able to get a high enough percentage of such "asexual" seeds to make them a factor in the production of uniform rootstocks, still his results point very strongly toward the desirability of carrying out extensive emasculation and bagging experiments with as many different varieties of apples and under as many different conditions as possible, with the expectation that the proper combination of varietal and environmental conditions will be found which will make such "vegetative propagation by seed" feasible.

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LIVING CELLS IN HEART-WOOD OF TREES

IN a special article entitled "Long-lived Cells of the Redwood," published in SCIENCE of November 11, 1927, D. T. MacDougal and G. M. Smith state that "We can not find any definite statement of living cells in heartwood," and conclude that the facts they present in connection with their study of redwood "seem to constitute the first announcement of living cells in heartwood."

They have evidently overlooked a paper by J. H. White, "On the Biology of Fomes applanatus (Pers.) Wallr." published in the *Transactions* of the Royal Canadian Institute, pages 133–174 of Vol. XII, 1919. Dr. White described the path of entrance of the fungus into the heartwood, and then the character of the changes induced. "A study of the living wood of trees attacked by *F. applanatus* shows, as I have already indicated, a feature not found in dead wood. I refer to a brownish discolored zone which marks the extreme limit of advance of the fungus," (p. 155). Within this band there were found deposits of wound gum, but more striking still "Tyloses constitute another remarkable feature of the brown zone." "I have found them in attacked sapwood and heartwood of several species in which search was made for them, including beech, sugar maple, and red oak." Convincing demonstration is especially easy in red oak.

[1] Zytologische Untersuchungen an Prunoideen u. Pomoideen. *Archiv Julius Klaus-Stiftung f. Vererb., Soz., u. Rassenhygiene.* 3(1): 1–84. 1927. Zürich.

[2] Polyembryony, heterozygosis and chimeras in Citrus. *Hilgardia.* 1(16): 365–402. 1926.

These do not occur similarly in adjacent sound wood.

There had been such a prevalent opinion among pathologists that heart-rotting fungi are not truly parasitic, because of the commonly accepted assumption that the heartwood is dead, that White took pains to show that such views were erroneous. After discussing evidence to be drawn from the "wound gum," he continues, "Tyloses fortunately do not suffer such variant opinions; they can be produced only by living cells. Their occurrence, then, proves that the invaded tissues are living . . . The tyloses arise as the result of a stimulation primarily induced by the fungus." (p. 163.)

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A PREHISTORY CHART

Professor A. E. Jenks, of the Department of Anthropology at the University of Minnesota, has designed a chart illustrative of the chronological sequences of archeological periods in prehistoric Europe and of typical artifacts of each period. The dimensions of this chart are three feet by four feet. The upper half is devoted to a chronological diagram of culture sequences in which the various glacial advances are represented by peaks and the interglacial periods by valleys. The associated cultures are distinguished by the varied colors of the different portions of this Pleistocene range. The several types of fossil man have their positions in the landscape indicated by guide posts.

The lower half of the chart shows drawings of characteristic implements of the successive periods, excellently delineated and clearly labelled. The selection of artifacts representative of the Paleolithic periods is very good. Limitations of space prevent an equally satisfactory display of objects characteristic of the Neolithic, Bronze, and Early Iron Ages. Nearly all of those represented on the chart come from the Scandinavian area. But the author has chosen carefully and well.

Teachers of history and of prehistoric archeology will find that Professor Jenks' chart is a valuable aid to themselves and to their students. Ten minutes' study of this chart will fix in the mind of the reader facts which ordinarily require for their absorption hours of concentration and much thumbing of leaves of text-books.

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PHILOSOPHY OR IRONY, WHICH?

IN the current number of SCIENCE, January 13, I read Dr. Stetson's short, but appreciative, review of Professor Eddington's "Stars and Atoms" and noted what the reviewer says of the author's sense of humor. However, there is one sentence in particular in which the humor is so "dry" that the casual reader may be led to draw the erroneous conclusion that Professor Eddington endorses the views expressed in the first two paragraphs of Bertrand Russell's "What I Believe." These two paragraphs are sufficient to convince the reader that the author finds his *Ultima Thule* in the electron.

There is nothing in the context leading to the sentence referred to above—nothing but the absurdity of the conclusion itself—that would lead one to regard the sentence as ironical; but I take it, in reality, to be a "sly dig" at Russell and his school. After showing the possible complexities to be expected under conditions due to terrestrial temperatures compared with the simple structures found associated with the high stellar temperatures, Professor Eddington concludes, p. 84:

> Our earth is one of those chilly places and here the strangest complications can arise. Perhaps strangest of all, some of these complications can meet together and speculate on the significance of the whole scheme.

My reason for regarding the above excerpt as ironical may be best expressed in Professor Eddington's own words as given in "Science, Religion and Reality," p. 214.

> Is the motion of the editor's pencil to grammatically amend the split infinitive in this sentence simply the automatic response under physical laws of a complicated configuration of electrons to the external stimulus of this smear of ink on paper? Such an extravagant hypothesis might conceivably appeal to the crude materialist who supposes that the world of electrons is the fundamental reality.

Verbum sap.

M. M. GARVER

THE SOUTH AFRICAN STATION OF THE HARVARD OBSERVATORY

A NOTICE in SCIENCE, January 20, 1928, on the new South African station of the Harvard Observatory was taken indirectly from an unedited article in a student publication; it contains several mistakes and extravagant statements, three of which perhaps justify correction.

1. Mazel's Poort where the Harvard station is located is not a city; it is the water works station of the city of Bloemfontein. The new road and other assistance are being provided by Bloemfontein.

2. The Harvard Observatory is constructing one 60-inch telescope, not three, for the southern station.

3. Mr. W. F. H. Waterfield leaves Cambridge for