In the University of London, Dr. Edward Barclay-Smith, of Cambridge, succeeds Professor Waterston in the chair of anatomy at King's College, and Dr. E. P. Cathcart, of Glasgow, succeeds Professor Leonard Hill in the chair of physiology at London Hospital Medical College.

DISCUSSION AND CORRESPONDENCE

EFFECT OF CYANIDE OF POTASSIUM ON TREES

To the Editor of Science: My attention has been attracted to an article in your columns by Professor H. A. Surface relative to the use of cyanide of potassium for eliminating insect attacks on trees. While I have not investigated the claim of the firm at Allentown, Pennsylvania, referred to in his article, and know nothing about their process, however, from my own results with cyanide of potassium, especially on elms and black locusts, I am convinced it is a valuable remedy.

The article above referred to gives the general impression that cyanide of potassium is the cause of tree death as well as various staining effects found in the bark, cambium, etc. My opinion is that the staining comes from the reaction between the tannic acid found in all trees and the iron found in this so-called "tree food" in the form of iron sulphate. It is well known that when solutions of tannic acid are brought into contact with iron or any iron salt, dark colored compounds resembling ink are formed. These are very permanent dyes and no doubt account for the dark color observed.

The cyanide of potassium as I have used it for years in eliminating borers from various trees has never caused any staining, nor have I ever known of its killing or in any way injuring a tree. I have been using it and prescribing it for the use of others for about twelve years in connection with my forestry work, and we have saved the lives of thousands of trees by means of it.

Large groves of thrifty elms and black locusts in Kansas and other parts of the west have been completely rescued from the attacks of boring and girdling insects by means of cyanide of potassium, and this article is the first intimation I have ever had to the effect that it is deleterious to tree growth. I am strongly inclined to feel that the blame is not properly placed and that a highly useful chemical for insect eradication is being condemned because of damages produced by other substances.

C. H. Shattuck
University of Idaho

GOSSYPOL—A TOXIC SUBSTANCE IN COTTONSEED. A PRELIMINARY NOTE

We have separated from cottonseed kernels a substance which appears to be identical with the substance which Marchlewski[1] separated from crude cottonseed oil and called gossypol.

We have administered in various ways, to rabbits, gossypol as prepared by us and have found it toxic in every case.

We have found as did Marchlewski that gossypol is quickly oxidized in an alcoholic solution of sodium hydroxide.

In a previous paper from this station[2] it was stated that "(alcoholic) alkaline treatment, very greatly diminishes if it does not entirely remove the toxic properties of the (cottonseed) meal," and it was suggested that the beneficial effect "may be due to hydrolysis or to the formation of a sodium salt or to some other change not yet determined definitely."

We now offer as an explanation that gossypol is a toxic substance and that its oxidation by an alcoholic alkali renders it nontoxic and thus diminishes if it does not entirely remove the toxic properties of cottonseed meal.

W. A. Withers,
F. E. Carruth
N. C. Agricultural Experiment Station,
Raleigh, N. C.,
December 31, 1914

SCIENTIFIC BOOKS

Bausteine zu einer Biologischen Weltanschauung. Von Jakob, Baron von Uexküll. München, F. Bruckmann A.-G. 1913.

[1] *J. für Prakt. Chem.* (1899), 60, p. 80.

[2] Withers and Ray, Science (1912), 36, p. 31.

Von Uexküll sketches and advocates a vitalistic "Weltanschauung" in eighteen popularized essays, collected for convenience into four larger groups, the whole, sponsored by Felix Gross, and dedicated to Stewart Houston Chamberlain. "Die Neuen Probleme" is introductory; "Der Neue Standpunkt" includes discussions of the invisible in nature, the "Merkwelt," and the problem of the animal mind; "Das Neue Weltbild" reproduces the tropical aquarium in a series of splendid word-pictures, and contains two essays devoted to the nature of life and five to the construction of a biological "Weltbild"; and finally, under the heading "Spezielle Fragen" we find ideas on morphogenesis, Mendelism, the origin of space, and a discussion of Pawlow's work in which for the first time in the reviewer's experience trypsin is met with playing the rôle of the "Hauptsprengstoff für die schwer verdaulichen Fette"! (p. 298).

Inasmuch as the arguments on which von Uexküll bases his vitalistic teachings have been discussed in an earlier review[1] and the present work contains nothing new in this respect, we may pass these over without further ado. There are three matters, however, which seem to deserve fuller mention; the first has to do with the general purposes of the book, the second, with the temperamental backgrounds of vitalism, whereas thirdly, we must consider a method proposed for application in the field of animal behavior.

To begin with, then, von Uexküll does not aim his guns primarily at the body of trained unbelievers, but, profiting by the experience of the Darwinian period of open debate, attempts to recapture for vitalism the public opinion taken in the earlier period by mechanistic assault. Such victories are theoretically quite beside the mark, but no one can look into the history of things without forming the impression that public opinion played an important part in the advance of mechanistic doctrine.

For the execution of this turning movement von Uexküll appears well equipped. He is afire with enthusiasm, gifted with a pretty wit, and is master of a literary technic the like of which has not been seen in biological circles since the days of the great Darwinian apologists. Furthermore, temperamental qualifications of another sort do special service in the hands of our reformer, and this brings us to our second point.

As some men under the strains of life are driven to church, so others, impressed with the difficulties of biology, take to vitalism. The impelling embarrassments are partly objective and well known to all; others, however, are individual, and of these von Uexküll carries a heavy load. One who asserts, "Die Amöben bleiben zeitlebens ein strukturloses Protoplasmahäufchen" (p. 210) and who claims, "In ganz frühen Stadien . . . besitzt der Keim keine Struktur" (p. 270), must be constituted blind to some of the best things in modern research.

In addition to these and numerous other specific subjective results, our author also sees in the lay mind many dire effects of current teachings. The world instructed by mechanical philosophers has lost the joy of life—"der Sternenhimmel ist den meisten Menschen zu einer greulichen verworrenen Rechenmaschine geworden, die ihnen einfach ekelhaft ist" (p. 259); men spend their days in senseless enumeration; believe that all the invisibles in nature are gases; accept a chemical morality but not its mirrored image; and, by the gradual working inward of their algebraized symbolism, are ailing and dying at the heart.

How much of this tragedy is true to life and how much a romantic adventure, is in the light of recent events not so easy to determine. It is hard, however, to consider all this a necessary consequence of mechanism, since Berkeley implied long ago that thoroughgoing mechanism and idealism may dwell at peace in the same mind. We are disposed to regard such lignifications of the heart and intellect, supposing them for the moment to have some objective reality, not as the inevitable results of a mechanism free from exaggeration, pretension and carelessness, but rather as the products of temperamental reactions to

[1] "Umwelt und Innenwelt der Tiere," SCIENCE, N. S., Vol. XXXI., pp. 303–305.

mechanism such as it unfortunately often is. All of which is suggestive not only to those who wonder why Germany, of all places, should prove a relatively favorable soil for modern metabiology, but to those also who ask whether the vitalistic-mechanistic debate can be closed.

Quite apart from these matters, von Uexküll's treatment of the environment, and of the relations of the organism thereto, has distinctly practical interest for the experimentalist. For Driesch the environment does not exist. Neither index of the two volumes on the "Science and Philosophy of the Organism" contains the word, nor is any discussion of the abode of life to be met with anywhere in the seven hundred pages of dreary text. Von Uexküll, on the contrary, is all aglow for the environment and its significance in the interpretation of life. Nor have these differences been without importance for the two authors under comparison; Driesch's reorganization of things biological has driven him out of the very field which should have proved more interesting than ever before; von Uexküll is continuing concrete observations and experiment and is pointing the way to further investigation with commendable fervor.

According to our writer, the environment of a living thing acquires special biological significance for us only when we discover and analyze those elements that actually act upon and with the organism in the normal give and take of daily existence. Such elements constitute the "Wirkungswelt." Further analysis differentiates out of the "Wirkungswelt" a "Merkwelt" which in the case of human beings, and perhaps wherever else it occurs, is specific for each individual.

These terms are practically self-explanatory. Air, for instance, is distinctly in our "Wirkungswelt," but may enter the "Merkwelt" under special circumstances. Now von Uexküll takes the position that students of behavior should limit themselves to a discovery by experiment of markworlds, and leave psychological considerations alone; brains and the objects of the external world can be experimented with, but of psychoses we can know one set only. The much exploited wonder-horses of Germany, the trained apes that open bolted doors, ring bells and order dinner, are monstrosities that have been forced to respond to the human order and not to normal constituents of either the horse- or monkey-world. Whether they have come to make these responses by trial and error, imitation or a system of rewards and punishments, is interesting only as a contribution to the art of unnatural history.

How the psychological difficulty is to be outflanked by this manœuver is not clear. The scallop's eye forms a retinal image like our own, yet the scallop "sees" only movements. To the specific forms, colors, sizes and the thousand other traits by which we distinguish one moving object from another this animal is blind. For the scallop a starfish, for us without taste or smell, has a pronounced odor indistinguishable from other chemical effects. Three marks in the following definite order (*time-scheme* as opposed to *space-scheme*) constitute a starfish in the scallop's "Merkwelt": movement, a general chemical mark, and a tactile stimulus. Given these in their orderly connection and the starfish is—"*wargenommen*"—that is, *perceived, observed, felt, taken care of, attended to,* or *availed of,* by the scallop. Clearly, until von Uexküll furnishes us with a system of notation by which the results of his experiments can be described without using words that suggest to every one the very thing upon which he has turned his back, discoveries concerning the markworld of the scallop are not likely to free us from the difficulties of an unanswerable question.

This does not mean that the method is inapplicable to cases in which the psychological question is respectable. On the contrary, James, in his essay "On a Certain Blindness in Human Beings," placed emphasis on the same spot fifteen years ago. In comparative psychology, and especially in experimental studies on human behavior, on the practise of education, and on the art of right living, numerous applications suggest themselves. If students adequately trained in the methods of science will seriously take up the experimental

analysis of normal markworlds, we may expect significant results in a field which needs them perhaps more than any other among the biological substations.

OTTO GLASER
UNIVERSITY OF MICHIGAN

SCIENTIFIC JOURNALS AND ARTICLES

THE closing (October) number of Volume 15 of the *Transactions of the American Mathematical Society* contains the following papers:

R. A. Johnson: "The conic as a space element."

G. A. Bliss: "The Weierstrass *E*-function for problems of the calculus of variations in space."

H. H. Mitchell: "The subgroups of the quaternary abelian linear group."

L. P. Eisenhart: "Transformations of conjugate systems with equal point invariants."

F. B. Wiley: "Proof of the finiteness of the modular covariants of a system of binary forms and cogredient points."

Dunham Jackson: "On the degree of convergence of Sturm-Liouville series."

C. E. Love: "Singular integral equations of the Volterra type."

G. C. Evans: "On the reduction of integro-differential equations."

L. E. Dickson: "Invariants in the theory of numbers."

Also addenda and errata of volumes 11 and 14 and general index of volumes 11–15.

THE November number (Vol. 21, No. 2) of the *Bulletin of the American Mathematical Society* contains: Report of the twenty-first summer meeting of the Society, by F. N. Cole; "Infinite regions in geometry," by E. B. Wilson; "Famous problems of geometry" (review of Hobson's Squaring the Circle, A History of the Problem), by R. C. Archibald; Shorter notices: Smith and Gale's New Analytic Geometry, by E. R. Smith; Marsh's Technical Trigonometry, by F. M. Morgan; Fite's College Algebra, by J. E. Rowe; Mitzscherling's Problem der Kreisteilung, by R. D. Carmichael; Kommerell's Allgemeine Theorie der Raumkurven und Flächen, by R. C. Archibald; Neumann's Fragen der höheren Potentialtheorie, by T. H. Gronwall; Kaye and Laby's Physical and Chemical Constants, by H. B. Phillips; "Notes"; and "New Publications."

THE December number of the *Bulletin* contains: "On a generalization of a theorem of Dini on sequences of continuous functions," by T. H. Hildebrandt; "Note on removable singularities," by W. E. Milne; "Concerning a certain totally discontinuous function," by K. P. Williams; "Proof of the convergence of Poisson's integral for non-absolutely integrable functions," by W. W. Küstermann; "The Napier tercentenary celebration," by D. E. Smith; "An appeal to producing mathematicians," by George Paaswell; Shorter notices: Zeuthen's Mathematik im Altertum und Mittelalter, by D. E. Smith; Minkowski's Geometrie der Zahlen, by L. E. Dickson; Elliott's Algebra of Quantics, by D. D. Leib; Fabry's Problèmes d'Analyse mathématique, by E. W. Ponzer; Demartres' Cours de Géométrie infinitésimale, by E. W. Ponzer; Engelhardt's Probleme im Schlusswort des Lies'chen Geometrie der Berührungstransformationen, by O. E. Glenn; Whiteford's Trisection of an Angle, by E. B. Lytle; Collins' Practical Algebra, by E. B. Lytle; Van Tuyl's Complete Business Arithmetic, by D. E. Smith; Martin's Text-book of Mechanics, by F. L. Griffin; Ott's Angewandte Mathematik an den Deutschen mittleren Fachschulen der Maschinenindustrie, by E. W. Ponzer; Jacoby's Astronomy, by K. P. Williams; "Notes"; and "New Publications."

THE January number of the *Bulletin* contains: Report of the October meeting of the Society, by F. N. Cole; Report of the twenty-sixth meeting of the San Francisco Section, by Thomas Buck; "Modular invariant processes," by O. E. Glenn; "Invariants, seminvariants, and covariants of the ternary and quaternary quadratic form modulo 2," by L. E. Dickson; "The converse of the Heine-Borel theorem in a Riesz domain," by E. W. Chittenden; "Complete existential theory of Sheffer's postulates for Boolean algebras," by L. L. Dines; "On the characteristics of the principal manuals of elementary geometry