culated form of it, limiting it to inhibitions only, but giving cogent reasons showing its merits. So far as I know, this note of Professor Kistiakowsky is the only paper on olfaction published in SCIENCE mentioning the catalyst theory.

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A Proposed New Name for the Cohesion Theory of Water Ascent in Plants

AFTER many years of experience attempting to teach students in general botany and plant physiology something about the Dixon theory—or cohesion theory, as it is usually called—of the ascent of water in plants, the writer has reached the conclusion that a better and more descriptive name for this process is needed.

The term "cohesion theory" merely describes a property of water which makes possible this method of flow. It does not give an indication of more fundamental factors, such as the source of energy involved in the flow or the state of the water while it is moving. The terms "transpiration pull" and "transpiration stream" are to some extent immune from these objections, but they imply that transpiration is an essential factor in the process and fail to make clear that any process in cells of the shoot that uses water operates in the same way as transpiration in increasing the DPD of the water in the cells and in effecting a consequent ascent of water. The use of the term "cohesion theory" in a sentence often results in a rather awkward statement.

The writer is proposing the term "shoot tension" as being more precise and descriptive, and definitely homologous with the term "root pressure." The term shoot tension localizes the source of the motive power in the cells of the shoot, whether they happen to be in a leaf, stem, or reproductive organ; it describes the state of the water in the xylem during its ascent; and it avoids undue stress of the role of transpiration. Note how much easier it is to say, "The ascent of water in plant A is due to root pressure, whereas its ascent in plant B is due to shoot tension," than it is to say, "The water in plant A is ascending because of root pressure, whereas the water in plant B is ascending in accordance with the cohesion theory (or cohesion, or cohesion of water)."

Students on whom the term shoot tension has been tried seem to grasp the idea faster than when the term cohesion theory is used. The writer is considering using the term shoot tension in a general botany textbook on which he is now working, and would therefore be interested in having the reactions of plant physiologists, teachers of general botany, and other botanists to the term. The writer is under no illusions as to the difficulty of introducing a new term as a substitute for a widely used old one, even though it may be much better. The slow progress in the substitution of "ovulary" for "ovary" is an example from another phase of botany. However, even slow progress is probably better than none.

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Book Reviews

The Chemistry and Action of Insecticides. Harold H. Shepard. New York–London: McGraw-Hill, 1951. 504 pp. $7.00.

Insect Control by Chemicals. A. W. A. Brown. New York: Wiley; London: Chapman & Hall, 1951. 817 pp. $12.50.

Two books have recently appeared that are of particular interest to the entomologist, the agriculturalist, the agricultural chemist, and the pesticide manufacturer. More than this, since insect control by chemicals cuts across many fields, these works discuss subjects of wide importance that should commend them to the attention of all those concerned with the effects of toxic chemical substances on animals and plants.

The Chemistry and Action of Insecticides is the enlarged and extended outgrowth of *The Chemistry and Toxicology of Insecticides* (1939), by the same author. In the opening chapter one is introduced to the enormous losses to crops, farm animals, and foodstuffs caused by insects and to the important place insecticides hold in reducing these. The history of insecticides is discussed briefly here (and frequently again in later chapters); a table presents the important events in the development of insecticides from about 1000 B.C. through 1948. U. S. federal regulations concerning adulteration, misbranding, and pesticide residues on food products receive brief comment, and a list of important books, periodicals, and abstract journals is appended. This chapter, like the succeeding ones, is concluded by a list of literature citations.

Then follow chapters on the various groups of insecticides—the elements, inorganic compounds, and mixtures that have received experimental trial or have gained a place in the practical control of insects; insecticides derived from plants; the oils, soaps, and creosotes; and the synthetic organic insecticides. Separate chapters are devoted to the more general aspects of chemical control (particle size, shape, and density of dusts; wetting and spreading of sprays; adsorption of gases; and related subjects), to relative toxicity and mode of action, and to the attractants and repellents. An appendix contains a conversion table of weights,

capacities, linear measures, etc., and a table of LD_{50} values determined by different techniques on various insect species.

Altogether, this work presents a clear, orderly treatment of the chemical control of insects and is abundantly documented by original source references. There are few printing errors, the illustrations, paper, and binding are good, and the format is pleasing. Some omissions are noted and the arrangement of material may be criticized in some places. *Biological Abstracts* and the *Experiment Station Record,* the latter no longer published but still important for its coverage of the older literature, are absent from the list of abstract journals in Chapter I; and bibliographic sources—the *Index to the Literature of American Economic Entomology* and the list published for many years by *Entomological News,* to mention only two—are lacking. The treatment of the inorganic insecticides appears overly full in view of the ascendancy of the synthetic organic materials. Space given to the arsenates of magnesium, manganese, aluminum, iron, and copper, for example, could be greatly reduced without detracting from the value of the book. This reviewer believes fumigants are sufficiently important in a work of this kind to merit a chapter of their own. But these considerations will not seriously detract from the general excellence of the book.

Insect Control by Chemicals is a different sort of book. It places greater emphasis on modern organic insecticides and modern machines and methods for their dispersal; it restricts the field by practically excluding attractants and repellents. The short, crisp style of presentation and abundant documentation (more than 2,000 references to cited literature) will appeal more strongly to the advanced student and professional worker than to the beginner. It provides a valuable source book for the research laboratory.

The opening chapter devotes 62 pages to descriptions of about 100 practical and experimental insecticides, mostly organic materials; the inorganics are dispensed with in about 7 pages. The next three chapters discuss the relation of the structure of organic chemicals to toxicity, the entrance of poisons into insects, and the pharmacology of poisons for insects. Information from more than 600 references is condensed in these pages into the most complete and thoroughgoing treatment of the essentials of insect toxicology this reviewer has seen. Two chapters covering equipment for ground and airplane application of insecticides are noteworthy for their discussions of the physical factors influencing the dispersal of insecticide particles. There is a chapter on the toxicity of insecticides to man and domestic animals and one on the effects of insecticides on plants. Two chapters discuss chemical control of insects that feed on plants and of those that affect man and domestic animals. Insect orders rather than crops (or animals) form the subdivisions under which the insecticides are discussed, enabling one to visualize quickly the types of compounds that affect broad insect groups. The last chapter treats the effect of insecticides on the natural balance of insect populations, featuring principally the pertinent information on DDT.

Some omissions and some statements that may appear incomplete or too categorical to critical readers have been noticed. These are to be expected in a text drawing upon so many sources of information. The few printing errors will be obvious to most readers but incorrect chemical formulas for nicotine (p. 132) and for parathion and ethyl *p*-nitrophenyl thionobenzenephosphonate (p. 158) should be pointed out.

This work should be a stimulus as well as an aid to research on insecticidal chemicals.

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Scientific Book Register

Nucleic Acids and Nucleoproteins: Physics, Chemistry, Biology, and Medicine, Vols. I and II. (In Japanese.) Fujio Egami, Ed. Tokyo: Kyoritsu Pub., 1951. Vol. I: 481 pp., 1,000 yen; Vol. II: 426 pp., 1,350 yen.

Insect Resistance in Crop Plants. Reginald H. Painter. New York: Macmillan, 1951. 520 pp. $8.50.

Vocabulaire de la Psychologie. Publié avec la collaboration de L'Association des Travailleurs Scientifiques. Henri Piéron *et al.* Paris: Presses Universitaires de France, 1951. 356 pp. 1,300 fr.

Finite Matrices. W. L. Ferrar. New York: Oxford Univ. Press, 1951. 182 pp. $4.00.

Outline of Fundamental Pharmacology: The Mechanics of the Interaction of Chemicals and Living Things. David Fielding Marsh. Springfield, Ill.: Thomas, 1951. 219 pp. $6.00.

Science in Progress, Vol. VII. Sigma Xi National Lectureships, 1949 and 1950. George A. Baitsell, Ed. New Haven, Conn.: Yale Univ. Press, 1951. 512 pp. $6.00.

An Introduction to Acoustics. Robert H. Randall. Cambridge, Mass.: Addison-Wesley, 1951. 340 pp. $6.00.

The Tsimshian: Their Arts and Music. American Ethnological Society Publications, Vol. XVIII. Viola E. Garfield, Paul S. Wingert, and Marius Barbeau. Locust Valley, N. Y.: J. J. Augustin, 1951. 290 pp. $6.00.

Recent Progress in Hormone Research, Vol. VI. Proceedings of the Laurentian Hormone Conference. Gregory Pincus, Ed. New York: Academic Press, 1951. 431 pp. $8.50.

The Normal Cerebral Angiogram. Arthur Ecker. Springfield, Ill.: Thomas, 1951. 190 pp. $6.50.

The Aurorae. International Astrophysics Series, Vol. 1. L. Harang. New York: Wiley, 1951. 166 pp. $4.50.

A Laboratory Guide to the Anatomy of the Rabbit. E. Horne Craigie. Philadelphia: Blakiston, 1951. 113 pp. $3.25.

Réarrangements Moléculaires et Inversion de Walden, Montpellier, 24–29 Avril 1950. Colloques Internationaux du Centre National de la Recherche Scientifique, XXX. Paris: C. N. R. S., 1951. 152 pp.

Anemias. Manuales Ibys, Vol. V. Valentin de la Loma. Madrid, Spain: Ibys, 1950. 393 pp.

The Theory of Isotope Separation as Applied to the Large-Scale Production of U^{235}. Karl Cohen and George M. Murphy. New York–London: McGraw-Hill, 1951. 165 pp. $2.00.