to be reclaimed by the metabolic process in vegetal organisms. This was found, for example, in the case of hordenine², caffeine and theobromine³, as well as with alkaloids of *Lupinus luteus*⁴. Other groups of secondary products of plant metabolism are expected to show a similar condition (glycosides, tannic substances, etc.).

All this tends to the conclusion that a plant, if necessary, falls back upon its own elimination products; that is, it can utilize, in a way that has not yet been elucidated, its own secondary products of metabolism for the benefit of its physiological requirements in the metabolic process of etiolation.

A. FREY-WYSSLING.
F. BLANK.

Laboratory of Plant Physiology,
Swiss Federal Institute of Technology,
Zurich. Dec. 3.

¹ Frey-Wyssling, A., and Blank, F., *Verh. Schweiz. Naturf. Ges.* (1940).

² Raoul, Y., *C.R.*, 205 (1937).

³ Weevers, Th., *Arch. Néerl. Sc. Naturelles*, 111/B, 4 (1930).

⁴ Wallebroek, J. C. J., *Rec. Trav. Bot. Néerl.*, 37 (1940).

Science and the Unobservable

PROF. KENNARD, in a discussion on the topic "Science and the Observable"¹ remarked: "Recognition of the limited scope of its generalizations and indifference to the unattainable seem to be two of the most valuable traits of the modern scientific method, as contrasted with the speculations of the medieval philosophers."

The implications of the word "unattainable" are not altogether clear. If here or in other similar contexts the implication is that only the "physically" observable is "observable", then it must be said that at the root of this supposition there is an oversight which is extraordinarily common. We *certainly* have other modes of acquiring knowledge of physical events than through the senses and their extensions in the apparatus of the physical laboratory. This oversight is so common that many readers of these words will probably challenge my statement until an evidential example is cited—a very easy thing to do.

I know *now* that within one minute of this instant the sheet on which I am writing will be covered with certain black marks which we call letters. This knowledge of certain physical events presently to come to pass has not reached me through my eyes, my ears, my cutaneous sense, nor by the aid of a microscope or any other physical laboratory apparatus, but through that faculty which I call my *will*.

That a large and important body of knowledge can be built up without mention of or reference to information possessed by the individual in this way is an interesting fact. But assuredly a description of Nature which omits all mention of the type of fore-knowledge illustrated in my example is not only incomplete, but also incomplete in a most important respect. To urge all scientific investigators scrupulously to omit this remarkable phenomenon from all their inquiries into physical events cannot ultimately be good advice. Even the physicist will probably err if he entirely omits this phenomenon from his contemplation of Nature; for Nature is a whole, and it is very unlikely that a fundamental understanding of it can be obtained if a part, and a probably very

important part, is deliberately excluded from consideration.

If in the past the intervention of conscious action in physical events has received very little attention from physicists, this can scarcely be regarded as a virtue of our present system, but rather as a defect which it may be anticipated the future, possibly the distant future, may in some degree overcome. Certainly the policy of setting up an arbitrary barrier and saying to all investigators "Beyond this ye shall not pass", seems utterly contrary to the very spirit of science.

ALFRED J. LOTKA.

Statistical Bureau,
Metropolitan Life Insurance Company,
New York City.
Dec. 3.

¹ NATURE, 141, 556 (1938).

Renal Injury in *Trichosurus vulpecula* Produced by Oestrogens

A SERIES of five males and five females of the common Australian phalanger or possum (*Trichosurus vulpecula*) of an average body-weight of about 2 kgm. were injected weekly with 2–5 mgm. of oestrodiol benzoate or oestrodiol dipropionate. These animals died or were killed between ten and thirty-nine days after the first injection. At death they all showed a markedly elevated blood urea content (190–500 mgm. per cent). On histological examination the kidneys showed a varying degree of cloudy swelling which frequently was associated with necrosis of the convoluted tubules. In many instances some of the collecting tubules were found to be dilated in their proximal portions. An outstanding observation was calcification involving the epithelial remnants in a few or many of the convoluted tubules. The picture was one of calcification of necrotic epithelium similar to that seen in mercury bichloride poisoning. It was observed in eight out of ten animals. Calcification was also occasionally seen in the muscular coat of small and large blood vessels. In addition, a series of seven animals was injected with a single dose of approximately 1 mgm. per kgm. body-weight of stilboestrol dipropionate. These animals were killed or died within 2–17 days. With the exception of the animal which was killed two days after the injection, similar functional and histological findings were obtained as in the previous series although calcification was observed in only two out of six animals.

These findings indicate that definite primary renal injury is produced in the marsupial *Trichosurus vulpecula* after the administration of comparatively large doses of oestrogens^{1,2}. No animals which developed the later complications, hydronephrosis and hydronephrosis, were included in this series³.

A. BOLLIGER.
A. J. CANNY.

Department of Surgery, and
Department of Pathology,
Gordon Craig Research Laboratories,
University of Sydney.
Dec. 12.

¹ Korenchevsky, V., and Ross, M. A., *Brit. Med. J.*, 645 (1940).

² Grollman, A., Harrison, T. R., and Williams, J. R., *J. Pharm. Exp. Ther.*, 69, 149 (1940).

³ Carroddus, A., and Bolliger, A., *Med. J. Australia*, 633 (1939).