showed hair loss and skin irritation around the anal region; this occurred less frequently in the guinea pigs.

Mixed pyrethrins, 2.4% rubbed into the hair and skin of six animals, produced no hair loss or skin irritation in rats or guinea pigs. One per cent pyrethrum placed into a rabbit's eye produced no immediate irritation, but a conjunctival bleb formed in 6 hours.

Mixed pyrethrins given in single doses of 500 mg. per kg. and repeated 6 times in 2 weeks (total administration of 3.0 gm. per kg.) killed 2 out of 8 rats.

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Acute Intraperitoneal Toxicity of Some Plant Growth Substances for Mice.

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Zimmerman and Wilcoxon[1] report the rooting and bending responses of plants to various "growth-promoting" compounds. Of the agents we studied, they find the per cent concentrations necessary for positive bending or injury to be (in order of decreasing toxicity): indolacetic acid 0.5; alpha-naphthalenacetic acid 1.5; indolproprionic acid 2.0; indolbutyric acid 2.0; and phenylacetic acid 3.0. In the human body the indole acids are derived presumably from tryptophane, and indolacetic acid can be recovered from urine. In carcinomata indolacetic acid occurs in concentration twice that of surrounding tissues according to Kögl, Haagen-Smit and Tönnis.[2]

We desired to determine whether any correlation exists between the relative toxicity of these compounds for plants and their relative toxicity in mammals. Mice, observed for 4 weeks, were used as test animals. The substances were dissolved in water or di-ethylene glycol, and fresh 1% dilutions were injected intraperitoneally. Indolacetic acid* kills half or more of the animals injected at 25 mg. per kg., alpha-naphthalenacetic acid† at 100 mg. per kg., indol-

[1] Zimmerman, P. W., and Wilcoxon, F., *Contrib. Boyce Thompson Institute*, 1935, **7**, 209.

[2] Kögl, F., Haagen-Smit, A. J., and Tönnis, B., *Z. Physiol. Chem.*, 1933, **220**, 162; Kögl, F., Haagen-Smit, A. J., and Erxleben, H., *Z. Physiol. Chem.*, 1933, **220**, 137.

proprionic and‡ at 100 mg. per kg., indolbutyric acid‡ at 100 mg. per kg., and phenylacetic acid§ at 300 mg. per kg.

Deaths occur in 10 to 20 minutes with large doses, and are delayed from 48 hours to 13 days with amounts just above tolerance. Respiratory embarrassment and failure were the only consistent toxic manifestations noted. Pulmonary congestion was seen in one-third of the animals examined at necropsy; gross pathologic changes other than pulmonic were not observed in animals dying within 48 hours. Solutions of indolacetic acid which were exposed to light and air for 7 days become amber-colored and are less toxic than fresh preparations, killing at 200 mg. per kg.

The lethal doses of the 5 compounds studied stand approximately in the same relative order for mice according to our findings as the toxic range noted for plants, on the basis of Zimmerman's and Wilcoxon's data. Table I summarizes our findings.

TABLE I.
Acute Intraperitoneal Toxicity in Mice of Some Plant Growth Substances.

Drug in 1% solution	Lethal dose in mg./kg.	Ratio of deaths to No. of animals used	Time of death
Indolacetic acid	25	12/19	6 hr. to 25 days
Indolacetic acid (after standing one week)	200	9/15	20 min. to 3 "
α-Naphthaleneacetic acid	100	5/10	20 " to 6 "
Indolproprionic acid	100	16/20	1 hr. to 10 "
Indolbutyric acid	100	8/15	24 " to 13 "
Phenylacetic acid	300	11/15	10 min. to 10 "

* Generously supplied by Merck and Co., Rahway, N. J.

† Generously supplied by Dr. P. W. Zimmerman, Boyce Thompson Institute for Plant Research, Yonkers, N. Y.

‡ Obtained from Dr. R. H. Manske, National Research Council, Ottawa, Canada.

§ Obtained from Eastman Kodak Company, Rochester, N. Y.