DISCUSSION

EXCURRENT CONES

ANOMALOUS cone growth in the conifers must yet prove to yield facts of value in simpler textual discussion. Many isolated notes and also illustrated articles have appeared in the course of the years, though all such had to await the acuter study of the fossil record and the cone organogeny of just the past twenty years. While the great cone dispute of a hundred years seems settled in favor of an inflorescent view, the unusual axial growths in the cones may now be viewed in far clearer light, meriting close study. The near certainty that the angiosperms are in their defined origin very old in geologic time adds a splendid evolutionary interest here.

A brief note in SCIENCE[1] last year calls attention to the very handsome excurrent cones of *Sciadopitys verticillata,* the Japanese "umbrella pine." Single terminal tines were first seen, and then later in the 1939 cone series whorls of three and four tines appeared. Now, however, some of these axes have again grown forward. During the past summer (1940) about a half dozen of the cones with the terminal whorls have grown a second such whorl, so that the full-grown seed cone as seen just now (midwinter) bears from seven to nine of the apical, normal foliar tines. Further growth of these axes seems likely. The late May, 1940, condition of the tree (about 30 feet high, but topped by a storm) was looked over by the senior class in botany at the Hunter College.

Also what appears to be the most instructive parallel to the renewed vegetative growth in the "umbrella pine" is found in *Cunninghamia sinensis.* Professor Medsger, of the Pennsylvania State College, has called my attention to the striking excurrent cone growth he found in this species planted as an ornamental in Charleston, South Carolina. The cuttings sent show forward growth of the cone axes to lengths of a foot or more bearing the handsome spiral set leaves, and secondary cone growth occurs too. As in other instances these fine variations from the norm seem partly dependent on some new or exotic factor in the environment, and even suggest experimental study.

Another fine example of excurrent growth was noted in *Cryptomeria.* All in all, these growths must occur far more widely than has been either recorded or suspected. They seem to fail in the short-shoot types—pines. Nevertheless the observed facts must have sound evidential value in the attack on that defyingly difficult problem of the morphogenesis of cone and flower. If, in let us say some really far back course of origin, the doubled or fused tines of the umbrella pine have a certain equivalence to the short shoot in the pines, then proof that the cone axis generally is neither simply floral nor of limited growth, is a point nearer. In either case easy transition from seed cones into such a superinflorescent condition as may be found in the Chinese "black pine" must mean something in the evolution of cone and flower as well as conifer origin. The greater subject is much nearer to sound discussion as said above than only a few years ago. More evidence from the fossil side is certain to appear. Seed fern antecedents of the conifers, and maybe dicots, too, are not too darkly suggested by the monocarpic and other Mesozoic cycadeoids.

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[1] SCIENCE, 91: 2359, 262–263.

KIDNEY STONES IN RANA PIPIENS TADPOLES REARED ON SPINACH

DURING recent years a number of papers have appeared containing the statement that tadpoles reared for experimental purposes were fed a diet containing boiled spinach. Recently the writer has reared *Rana pipiens* tadpoles for various purposes on a diet made up of (1) a dried food consisting of liver, pablum, milk and (2) boiled spinach. The animals were fed two or three times each week on the dried food and usually twice each week on spinach. Growth was fairly rapid. The tadpoles attained a length of approximately 60 mm and began to metamorphose at an age of about three months. Two hundred and fifty-two of these animals were autopsied at the time of metamorphosis. Of these two hundred and twenty-seven were found to contain numerous large kidney stones. These were hard, transparent or translucent, and slightly yellow in color. They were of elongated cylindrical shape and appeared to be deposited in the tubules. A second group of tadpoles has been reared on a diet made up of the dried food listed above but with lettuce replacing the spinach. Seventy-four of these have been autopsied approximately at the time of metamorphosis. In two cases there were a few minute opaque crystalline deposits in the tubules, but in the remaining 72 animals the kidneys were well formed and contained no stones.

The explanation for the deposition of crystalline stones in tadpole kidneys may be found in the high oxalic acid content of spinach recently reported by Kohman.[1] Kohman found that rats given a diet containing spinach grew poorly and deposited much less

[1] E. F. Kohman, *Jour. of Nutrition,* 18: 233, 1939.

calcium than rats fed on a diet in which other greens containing negligible oxalates replaced spinach. Rats fed on spinach also excreted considerable oxalate in the urine and feces. From these results it appears that the kidney stones developing in tadpoles may be composed of calcium oxalate.

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SCIENTIFIC MEN IN THE HALL OF FAME

THE only scientists in the Hall of Fame at New York University to date are: John James Audubon, Asa Gray, Louis Agassiz, Joseph Henry, Maria Mitchell, Matthew Fontaine Maury and Simon Newcomb.

There are 110 distinguished Americans who constitute the College of Electors, and at their ninth quinquennial election, reported at the end of last year, they elected (with 86 votes) only Stephen Collins Foster, the first musician to enter. Dr. Walter Reed, hero of the fight against yellow fever; Henry David Thoreau, naturalist and author; and J. Willard Gibbs, physicist and chemist, whose work was so important that Professor Wilhelm Ostwald years ago printed a German translation of it—all these came very close to getting the 65 votes essential to election.

The next election is in 1945. In the interim it behooves scientists to see to it that the College of Electors has adequate information to enable them to give full and fair consideration to scientists eligible for this honor. Audubon and Reed were included in the postage stamp series honoring scientists, along with Jane Addams, Luther Burbank and Dr. Crawford H. Long.

JEROME ALEXANDER

FIRE HAZARD IN STERILIZATION BY DI-ETHYLENE GLYCOL

WHEN I read the article entitled "Sterilization of Surgical Instruments by Di-ethylene Glycol" by Charles Gurchot and Newton D. Mellers (SCIENCE, November 29, 1940, p. 516) I had an uneasy feeling and made a cursory search for reported properties of di-ethylene glycol. I found values of its flash-point cited as low as 135° C.

Since the flash-point depends considerably upon the exact conditions of test, I made a few rough experiments planned to approximate the conditions in a sterilizer. Heated in an evaporating dish to 145° C. di-ethylene glycol caught fire readily and burned with increasing vigor until I extinguished it.

At temperatures as low as 135° the fumes ignited on contact with a flame. Between 140° and 145° continued burning with increasing vigor sometimes occurred and at 145° and above always occurred.

I feel, therefore, that your readers should be warned that the use of di-ethylene glycol as recommended involves a very definite fire hazard. Under some conditions it might result in a serious fire.

L. B. TUCKERMAN

NATIONAL BUREAU OF STANDARDS

SCIENTIFIC BOOKS

EMBRYOLOGY OF INSECTS AND MYRIAPODS

Embryology of Insects and Myriapods. The developmental history of insects, centipedes, and millepedes from egg deposition to hatching. By OSKAR A. JOHANNSEN, professor of entomology, emeritus, and FERDINAND H. BUTT, instructor in insect morphology, embryology and histology, Cornell University. Pp. xi + 462, 370 figs. New York and London: McGraw-Hill Book Company, Inc. 1941. $5.00.

THE study of the embryonic development of animals, insensibly to most students of the subject, has differentiated into two phases, one of which is embryogeny, the other embryology. The first is what the growing animal does, and how it does it; the second is a mental product of the embryologists, an attempt to explain the nature, the meaning or the significance of the demonstrated facts of embryogeny. Our knowledge of embryogeny has had a steady growth; embryology has gone through many revolutions. Though the book here discussed is entitled "Embryology of Insects and Myriapods," its subject-matter is mostly embryogeny, which is what it should be as a suitable text for college students. Wherever controverted subjects or theoretical interpretations are given, both sides, or all sides, are presented without an effort to settle the question or to direct the opinion of the reader. The essential facts that are known concerning the embryonic development of the insects and the myriapods are clearly stated and excellently illustrated. The reader will find, too, that in many aspects of arthropod development, even among the insects, there is yet much to be done in determining precisely just what the facts are. It is a valuable feature of a text-book to emphasize discrepancies of observation or opinion, since it will suggest to students lines of investigation that might profitably be taken up as subjects for further study. The illustrations of the text are remarkably good, and their uniformity of style contributes much to the general appearance of the book. Nearly all the pictures seem to be new, but many have a familiar look about them, like something old with a new finish; the mystery is explained in the preface, where the authors state that the figures taken from the works of others have all been redrawn and in many cases "conventionalized."