the equator with a very small temperature range (Illinois bass tolerate 32° F. to 90+° F.). In no case did the Naivasha scales show an annulus near the edge. The amount of scale-growth outside the last annulus averaged 97 per cent of the corresponding whole year's growth in the scales of older fishes. Since these scales were collected on March 17, it would seem to indicate that annuli would be formed very soon—probably in April. It may be expected that they also spawn at this time, since spawning and annulus formation are known to occur at about the same time.

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Course of Pollen Tube Growth in *Carica papaya* and *Cucurbita* spp.

IN a recent paper, Gustafson[1] states with reference to pumpkin and crookneck summer squash (*Cucurbita* spp.) that the "application of pollen to one side of the ovary did not limit the development of the seeds to that side, and the seed distribution was quite uniform even when as much as five-sixths of the stigma had been removed. . . . It was expected, however, that the seeds might develop only on that side of the ovary where the pollen was applied and the side without seeds would be apertrophied". Work on the course of pollen tube growth in *Carica papaya*, carried on by us in Florida in 1936 as part of a Bankhead-Jones project, has a bearing on this subject. The Caricaceæ are related not distantly to the Cucurbitaceæ, but the former have superior ovaries in contrast to inferior ovaries in the latter. However, the general place of entry of the pollen tubes in relation to the extent and display of the placental surface is similar.

The paraffin embedding method was used in this work, and the pollen tubes were stained with acid fuchsin to which light green was added according to the formula of Buchholz. In *Carica papaya*, the pollen tubes grow from the stigma through the central region of the style to the apical end of the ovarian cavity, and then emerge into, and grow on, the surface of the ovarian cavity to the ovules. The ovarian cavity is relatively large (approximately 18 mm. long in the material used), and under the conditions of the experiment it took about five days for the pollen tubes to reach the ovules at the proximal end, although the ovules at the apical end were reached in about one and a half days. Since the tubes enter the ovarian cavity directly at the centre at the apical end, it would make no difference from which part of the stigma the tubes started, and the direction of growth after entering the ovoid or rounded cavity, other things being equal, would be dependent on chance alone. If sufficient viable pollen is applied to any part of the stigma, the thousand ovules (more or less) in the ovarian cavity may all be fertilized, unless some such condition as incompatibility or difference in state of receptivity intervened. If insufficient viable pollen is applied, then the ovules in any region equidistant from the apical end of the cavity will have an equal chance of being fertilized so long as there remain a sufficient number of pollen tubes. This would explain the uniform seed distribution in the fruits of *Cucurbita* spp. even if pollen was applied to one side of the stigma only.

The complete results will be published in the *Journal of Agricultural Research*.

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Ferrous Iron in Soils

THERE has been a controversy in the literature concerning ferrous iron in soils on three points, namely: (1) Is ferrous iron present in large quantities in ordinary healthy soils? (2) Can soil fix iron in the divalent form? (3) Does the downward movement of iron in soils, such as the podsols, take place in the ferrous condition?

The details of the experiments undertaken to elucidate the problems outlined will be given elsewhere. In this communication merely the results and conclusions are presented. In all the work reported the ferrous iron was determined by the dipyridyl method[1], and the experiments were conducted on black chernozem and grey wooded podsol soils.

To study the formation of ferrous iron and its downward movement black and podsol loams were kept submerged under distilled water in percolators. During the first twenty-six days of the experiment no ferrous iron was found in the percolates. After the experiment had continued for sixty-five days small quantities of ferrous iron were found in some of the percolates, ranging from 9–27 gamma in the volumes of liquid collected during twenty-two hours. Only traces of ferrous iron were found in water extracts of portions of soil taken from the percolators.

The same portions of soil were then extracted with approximately 3 per cent solution of aluminium chloride. An average of 750 gamma of ferrous iron was extracted from 1 gm. of black loam and 425 gamma from 1 gm. of the podsol loam, these figures being given on the basis of oven-dried soil.

This experiment indicates that soils must be waterlogged for a considerable period of time before iron moves in the ferrous state, and that certain soils, at least, can hold a considerable amount of iron in the divalent form, which is not easily removed by water, but can be extracted by aluminium chloride solution. Approximately 75 per cent more ferrous iron was extracted from the black soil than from the podsol soil, indicating that the presence of organic matter under anærobic conditions encourages formation of ferrous iron.

In another experiment it was shown that from a solution of ferrous chloride approximately 1,500 gamma of ferrous iron were absorbed by 1 gm. of moist black loam, and 1,300 gamma by 1 gm. of moist podsol loam, within a two-hour period, the black loam absorbing all the iron supplied. After a twenty-four hour interval $10{\cdot}56\,N$ solutions of