temperature within 5 min of the change of bath temperature. Fresh animals from the field (field controls) were maintained 1 to 2 days at room temperature (22° to 26°C) prior to testing. Experimental animals were kept at the constant temperature of 35°C for 7 to 9 days (the acclimation period used) prior to testing. All lizards were collected in Sabino Canyon, near Tucson, Ariz., during April and May.

The critical thermal point of locomotory disability in *U. ornatus* under such experimental conditions is readily observed, in order to allow a respectable degree of accuracy for determination of the critical thermal maximum for the individual. The concept of the critical maximum and critical minimum of Cowles and Bogert (*3*) for a population may be modified so that either measurement may be visualized as a value that is the arithmetic mean of the collective thermal points at which locomotory activity becomes disorganized and the animal loses its ability to escape from conditions that will promptly lead its death.

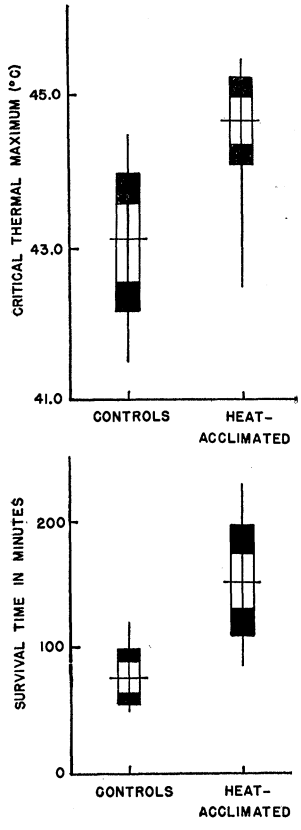

Fig. 1. Critical thermal maxima (°C) and resistance times (minutes) for the lizard *U. ornatus linearis* acclimated for 7 to 9 days at 35°C. The significant differences are shown graphically by the wide spread, without overlap, of the white rectangles, which represent values of two standard errors on each side of the mean. One black and one white rectangle combined, on each side of the mean, represents one standard deviation.

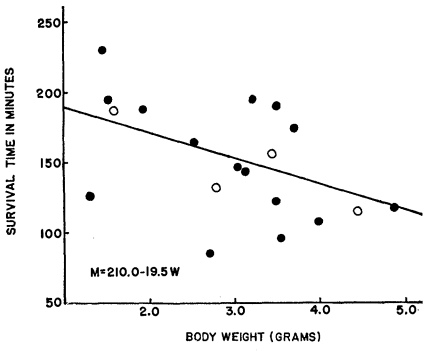

Fig. 2. Correlation of survival time with body weight for *U. ornatus linearis*. The four open circles represent the observations (black dots) grouped with class interval widths of 0.5 g, yielding a regression coefficient of $M = 215.7 - 22.6W$, which is not significantly different from the regression coefficient of the unclassed observations.

From the ecological and evolutionary point of view this *is* the lethal "point."

The means and their standard errors for the determinations of the critical thermal maximum in degrees centigrade, and their associated values of t and P, are as follows: Heat acclimated sample —44.5 ± 0.17; controls—43.1 ± 0.25; $t = 5.6$, $P < 0.001$ (Fig. 1).

The means, standard errors, t and P for the determinations of resistance time in minutes are as follows: Heat acclimated sample—152.8 ± 11.3; controls—76.4 ± 6.7; $t = 5.8$, $P < 0.001$ (Fig. 1).

The fact of a well-marked acclimation of the critical thermal maximum of *U. ornatus* is clearly established by both sets of data, which are graphed in Fig. 1. It may be seen that there is a direct, rather than an inverse, relationship between the direction of acclimation change and the acclimating temperature. The acclimating temperature used (35°C) is the mean of the normal activity range (eccritic mean) determined by us for the subspecies used (*3*).

Figure 2 depicts the inverse relationship between resistance time and body size (and age) for acclimated animals. The smaller (younger) individuals show greater resistance when subjected to relatively high environmental and body temperature. Moreover, under the experimental conditions employed, the small individual is at a given body temperature slightly longer than the larger individual, because of the more rapid heating of the smaller individual as a result of its greater surface-to-volume ratio.

The regression lines in Fig. 2 were fitted by the method of least squares. A hyperbolic curve has not been fitted, simply because of the scatter distribution of the small sample ($N = 15$). The correlation coefficient r is -0.474 for the individual ungrouped plots; the correlation is significant. For the same data (Fig. 2), when they are grouped with class interval widths of 0.5 g, r becomes -0.870, which is significant.

It has thus been demonstrated (i) that the critical thermal maximum of the lizard *U. ornatus* is significantly modified by acclimation to temperature, (ii) that the relationship between acclimation and acclimating temperatures is direct rather than inverse, and (iii) that the resistance to heat death is greater in the smaller, younger individuals.

After 7 to 9 days acclimation at a constant temperature of 35°C, the critical thermal maximum was increased by 1.4°C, and the resistance time at 44°C was approximately doubled.

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Effect of N-m-Tolylphthalamic Acid on Tomato Flower Formation

The *N*-arylphthalamic acids were first described by Hoffman and Smith [*Science* **109**, 588 (1949)] with regard to their influence in promoting fruit set in the tomato. We have subsequently found *N-m*-tolylphthalamic acid of practical value for promoting early fruit set of field-grown tomatoes when cool nights often prevent normal pollination of the first flowers.

In the spring of 1954, this chemical at a concentration of 200 parts per million (ppm) was applied to the foliage of eight tomato varieties in an attempt to promote early fruit set under greenhouse conditions. Three consecutive sprays were applied at approximately 2-wk intervals at anthesis of each of the first three clusters. Since environmental conditions were favorable, no influence of the chemical on fruit set was noted. However, it was observed later that the number of flowers, beginning with the fourth cluster of treated plants, was strikingly increased. This increase in flowers was accompanied by greater numbers of fruit on the fourth to seventh clusters (Table 1).

A field study during the summer of 1954 on 40 tomato varieties included both determinate and indeterminate types. During flowering of the first clus-

Table 1. Effect of *N-m*-tolylphthalamic acid (200 ppm) applied at anthesis of the first, second, and third flower clusters on the number of flowers and fruit in successively developing clusters of the tomato

Cluster No.	Flower number			Fruit set		
	Control	Treated	Increase	Control	Treated	Increase
1	7.3	7.2	− 0.1	7.1	7.2	0.1
2	7.2	8.0	0.8	6.9	7.2	0.3
3	6.7	8.4	1.7	6.3	6.3	0.0
4	7.4	11.7	4.3	6.1	5.5	−0.6
5	7.3	18.7	11.4	5.7	7.5	1.8
6	6.8	20.6	13.8	5.8	9.1	3.3
7	6.5	18.1	11.6	5.3	10.9	5.6
LSD 5% (Cluster × treatment)			5.4			1.5
LSD 1%			7.1			1.9

ters in June, three consecutive weekly applications of *N-m*-tolylphthalamic acid (200 ppm) were made to randomized rows in replicated blocks of all varieties. Although the normally determinate varieties were not appreciably affected, growth of the main axis of all indeterminate varieties terminated by 25 July in clusters of 50 to more than 100 flowers. This effect on flowering in the field was more pronounced than that observed in the greenhouse and resulted in delayed maturity and a decrease in total production.

Previous observations suggested that the visual effect of the chemical on flower number occurred approximately 6 wk after treatment. Since anthesis of the first flower cluster on standard tomato varieties grown at night temperatures of approximately 60°F usually occurs 6 to 8 wk after cotyledon expansion, treatment at an early seedling stage might affect the number of flowers differentiated in the first cluster. Groups of seedling tomato plants (var. Michigan State Forcing) were treated at cotyledon expansion or 1 wk later with five concentrations (50, 100, 200, 300, and 400 ppm) of *N-m*-tolylphthalamic acid. The numbers of flowers differentiated in the first clusters are listed in Table 2. Treatment at cotyledon expansion had no effect on flower differentiation, but application of 300 ppm 1 wk later showed an increase in flower number that was significantly greater than that in the controls. The number of nodes preceding the first flower cluster, however, was not altered. Although the number of flowers was also increased by 400 ppm, the main axis tended to terminate with the first flower cluster. Observations of flower number in later developing clusters established that treatment 1 wk subsequent to cotyledon expansion affected only the number of flowers in the first cluster.

Thus it appears that, in addition to promoting fruit set of the tomato plant, *N-m*-tolylphthalamic acid may influence flower formation in later developing clusters and if applied to young seedlings will increase flower number in the first cluster. It and other *N*-arylphthalamic acids are suggested for further studies of flowering and fruiting in higher plants.

Table 2. Effect of *N-m*-tolylphthalamic acid applied at cotyledon expansion and 1 wk later on the number of flowers in the first cluster of the tomato

Concentration	Cotyledon expansion	1 week after cotyledon expansion
Control	6.2	6.0
50 ppm	5.9	7.0
100 ppm	6.2	8.0
200 ppm	6.4	8.0
300 ppm	5.7	9.1*
400 ppm	5.7	9.1*
Mean	6.0	7.9†

* Differ significantly from the control at the 1-percent level.
† Difference between early and late treatment significant at the 1-percent level.

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Chalconatronite, a New Mineral from Egypt

The occurrence of a new mineral, chalconatronite, has been observed among the corrosion products of three ancient bronze objects from Egypt. The name is given in allusion to its composition as a double carbonate of copper and sodium from the Gr. *chalcos*, copper, and *natron* (Ar. *natrūn*), the modern name for naturally occurring sodium carbonate. Two of the occurrences are from the hollow interior bases of bronze figures of the Saite-Ptolomaic Period (663–630 B.C.), and the third is from the under surface of a bronze censer (Freer Gallery of Art, 52.1) of the late Coptic Period of Egypt (before 8th century A.D.). Nothing is known about the exact origin of the bronzes in Egypt, but presumably they were long buried in the earth.

Chalconatronite is found as a fine-grained, greenish-blue crust, associated with cuprite and atacamite. Chemical analysis of the product from the base of the first figure, a seated Sekhmet (lion-headed female deity) in the collection of the Fogg Museum of Art, Harvard University (No. 1943.1121a) shows the following percentages: Na_2O, 20.0; CuO, 26.8; CO_2, 29.5; H_2O, 20.4; PbO, 2.8; SiO_2, 0.5; R_2O_3, 0.6; total, 100.6. The formula is $Na_2Cu(CO_3)_2 \cdot 3H_2O$. The lead is an impurity derived from lead admixed with the parent metal, Cu-Sn bronze. The mineral is partially soluble in water with decomposition and completely soluble with effervescence in cold dilute acids.

Chalconatronite is the sixth natural carbonate to be described that contains copper as an essential constituent. These include malachite, azurite, aurichalcite, rosasite and voglite. Of these only malachite, azurite, and the present species have been observed as alteration products on ancient metal objects.

The crystals are probably monoclinic. Many are in the form of small, pseudohexagonal plates; others are lath shaped. The substance is highly birefracting and distinctly pleochroic. The optical properties are n X = 1.483 (nearly colorless), n Y = 1.530 (pale blue), n Z = 1.576 (blue); 2V large, probably positive; Z perpendicular to flattening of the crystals; Y parallel to elongation of the laths; $Z \wedge c$ apparently very small.

The hardness is low and the mineral tends to be a little chalky; specific gravity is 2.27 ± .03.

The x-ray powder diffraction pattern is sharp. The d spacings of the five strongest lines, listed in order of decreasing intensity, are 6.92, 4.17, 3.68, 2.87, and 2.42 A.

The formation of chalconatronite appears to result from the reaction of surface or subsoil waters carrying alkali carbonates in solution, either directly with the copper alloy or with intermediate alteration products, such as malachite or atacamite. Waters of this type characterize the arid regions of Egypt. Conditions in the hollow interiors of bronze objects seem to favor the formation of unusual mineral types.

Although this naturally occurring compound seems not previously to have been described, the corresponding artificial substance has long been known. A summary account of the chemistry of the synthetic compound $Na_2Cu(CO_3)_2 \cdot 3H_2O$, first prepared by Deville in 1852,