TABLE 1

COLOR OF TAIL TIP OF JUVENILE PIT VIPERS

Source of specimens*	Yellow		Dark		Total
Bothrops atrox					
Tihuatlan, Veracruz, Mexico	♂	12	♂	0	
(UIMNH)	♀	0	♀	8	20
Guatemala (CAS)†	♂	2	♂	0	
	♀	0	♀	3	5
Port Utria, Colombia (USNM)	♂	13	♂	0	
	♀	0	♀	13	26
Bothrops nummifer					
Portillo Grande, Yoro, Honduras	♂	13	♂	0	
(CNHM)‡	♀	17	♀	0	30
Rio Indio headwaters, Panama	♂	8	♂	0	
(ANSP)	♀	7	♀	0	15
Pueblo, Nuevo, Honduras (UMMZ)	♂	3	♂	0	
	♀	1	♀	0	4
Orizaba, Veracruz, Mexico	♂	2	♂	0	
(USNM)	♀	2	♀	0	4
Agkistrodon contortrix					
Eleven miles northwest of Frederick, Frederick County, Mary-	♂	3	♂	0	
land (UIMNH)	♀	2	♀	0	5
Two and a half miles east of Lamb, Hardin County, Illinois	♂	6	♂	0	
(INHS)	♀	4	♀	0	10
Three miles north of Valmeyer, Monroe County, Illinois	♂	2	♂	0	
(INHS)†	♀	0	♀	0	2
Three miles north of Effingham, Effingham County, Illinois	♂	2	♂	0	
(INHS)	♀	3	♀	0	5

* The following abbreviations are used for the institutions from which specimens were examined: ANSP, Academy of Natural Science of Philadelphia; CAS, Chicago Academy of Sciences; CNHM, Chicago Natural History Museum; INHS, Illinois Natural History Survey; UIMNH, University of Illinois Museum of Natural History; UMMZ, University of Michigan Museum of Zoology; USNM, U. S. National Museum.

† Probably not the complete litter.

‡ Mixture of several litters.

The scanty information available concerning the food of the several juvenile agkistrodons with bright tail tips in both sexes suggests a preference for frogs and small lizards. To illustrate, using information pertaining to one of the better-known forms, Chenoweth (*2*) writes that a litter of young copperheads ate cricket frogs (*Acris gryllus*) and a single anole (*Anolis carolinensis*), but steadfastly refused baby mice. That the latter is not always strictly the case is obvious from Gloyd's (*5*) statement that "At ages of two to three weeks some of the young fed upon small mice." The jumping viper, *Bothrops nummifer*, which has a bright tail in young of both sexes, may not fit into this scheme, as the only known food items of juveniles are crickets and grasshoppers. However, in none of these instances is the food of juveniles under natural conditions definitely known.

It would be very presumptuous to base definite conclusions on such scanty information. The data available do suggest that:

1. Pit vipers of which the young may depend on prey attracted to worms have bright-colored, wormlike tail tips in both sexes and exhibit the typical tail wiggling activity.

2. In those in which the young in one or both sexes lack the yellow tail tip, and exhibit no typical tail wiggling behavior, the food may be more generalized.

Although these generalizations are far from confirmed, they should be called to the attention of persons having the opportunity to gather pertinent information.

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Molybdenum Deficiency in Dunkirk Silty Clay Loam

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In 1939 Arnon and Stout (*2*), using culture solutions, obtained evidence that molybdenum is an essential element. Molybdenum deficiencies in crop plants grown on soils in Australia, New Zealand, and Europe have been reported, but the writer knows of no similar deficiency in the Americas except in serpentine barren soils of California (*5*). Response to molybdenum was also obtained in New Jersey in pots in the greenhouse as a result of dipping seed pieces of potatoes in dilute solutions of molybdenum (*1*). Davies and Mitchell (*3, 4*) did pioneer work on molybdenum deficiency in cauliflower. The latter noted marked differences in varietal susceptibility to whiptail. Wessels (*7*) had previously noted varietal differences on acid soils on Long Island, New York. He did not get symptoms of whiptail when a susceptible variety was grown on similar acid soils in the greenhouse. For the Long Island soils used, he found that the range of soil reaction for maximum cauliflower production was between pH 5.5 and 6.6. Yellowing and whiptail were found in soils below pH 5.5.

On October 8, 1949, the writer observed a cauliflower strain trial conducted by Paul Work and George Elle near Ithaca on Dunkirk silty clay loam, a productive and extensive soil type. Replications on the higher part of the plot showed marked whiptail in varieties of the Super Snowball type and practically none on strains of Improved Holland Erfurt (Snowdrift). A weather station located within one mile of the plot indicated a deficiency of 2.68 in. of rainfall (departure from normal) for the months of June through October. A considerable part of one rain of 2.43 in. on August 29 probably ran off the higher part of the plot. Soil was obtained to plow depth from the area of maximum whiptail and placed in ½-barrel steel drums that had previously been painted with a nontoxic asphalt varnish. These large containers were used in an attempt to avoid frequent watering, which it was felt might have been responsible for the failure of Wessels' greenhouse plants to show whiptail, as they did in the field.

The soil was allowed to dry in the drums until February 8, 1950. On February 9, 2 cauliflower plants of a strain of Super Snowball, seeded December 6, spotted into similar soil December 22, and grown under fluorescent lights, were planted in each container and fertilized with a small amount of KNO_3. On February 24, reagent grade KH_2PO_4 in solution to supply 500 lb to the acre and borax to give 10 lb to the acre were added in trenches 2½ in. deep and 4 in. from the plants. Six of the drums were supplied with ammonium molybdate at the rate of 1 lb to the acre in the trenches, and 4 received no molybdenum. Additional drums could not be placed in the greenhouse space available. KNO_3 at the rate of 200 lb to the acre was added, and the soil watered. On February 27, the soil in all drums was thoroughly wet, and 5 of the drums were covered with wet burlap bags that dipped into water in jars beside the drums. The bags covered practically all the soil in the drums but did not touch the plants or the soil. The wet bags reduced water loss from the soil, and these drums were not watered during the course of the experiment. The other 6 drums were watered heavily, but not leached, whenever the soil became dry.

The plants in all the drums turned somewhat yellow following the heavy watering prior to and including that of February 27. On March 17, it was noted that those in both series receiving molybdenum were greener than those without molybdenum. Differences in growth and color became more marked daily and were very marked on March 29, when the experiment was terminated because the plants in the dry soil were wilting slightly during the warm part of the day. All the plants lacking molybdenum showed marked interveinal chlorosis, as noted by Davies and Waring and Wilson and Shirow (*3, 6*). Growth was very upright, and the leaf tissue appeared brittle. A few of the smaller leaves showed parts of the laminae greatly reduced, suggesting a condition similar to whiptail. A few leaves had dead tissue at the edges. All plants supplied with molybdenum were of dark-green color and growing normally. The average weight of the plants cut off at the soil surface from soils with molybdenum was 429.5 g; the weight of those not supplied with molybdenum was 310.7 g. There was little difference between plants in the two moisture treatments. It is probable that the plants not supplied with molybdenum obtained some molybdenum from the drums in spite of the coating of varnish. The pH at the end of the experiment was 4.60.

C. B. Raymond, after seeing the marked response of the cauliflower to molybdenum, stated that on June 1, 1948, he had noted areas of very poor growth in red clover seeded for a cover crop in the same field. He made a map of the field and obtained pH readings. Areas with good clover averaged pH 5.40, whereas those with poor clover averaged pH 4.90. A check with Raymond's map disclosed that the soil for this cauliflower experiment was obtained in the center of one of the largest areas that showed poor clover growth in 1948. Much of the literature on molybdenum deficiency indicates that clovers are especially susceptible.

Experiments on this plot with cauliflower plants from the same seed lot as used in the greenhouse show a marked response to molybdenum. On August 1, 1950, it was evident that practically all the plants not supplied with molybdenum would be so badly whiptailed as to produce no marketable cauliflower.

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A Simple Apparatus for Producing Droplets of Uniform Size from Small Volumes of Liquids

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Frequently in the study of sprays of plant-growth regulators, fungicides, and insecticides it is pertinent to observe the behavior of droplets on the vegetation. For a long time it has been observed that foliage is wetted more readily by aqueous sprays containing certain surface-active agents and by oils than by wholly aqueous sprays. Moreover, the leaves of different species vary in their ability to retain droplets of various kinds of liquids. Conventional spray equipment is unsuitable for studying the action of individual droplets impinging on the leaves of different species. Likewise, the usual spray equipment is not satisfactory for applying low volumes of liquid (.01–.1 ml) as small individual droplets of uniform size to individual leaves or plants. By utilizing a principle devised by Lane (*1*) and Levvy (*2*) for producing small drops of liquid, a simple glass apparatus has been designed which produces in quantity individual droplets of uniform size and is adaptable for delivering very small volumes of aqueous and nonaqueous solutions. The apparatus has been termed a droplet sizer.

One end of a glass tube was drawn into a very fine capillary, and the tip was broken off at a point where its diameter was just small enough that water would not run through except under low pressure (Fig. 1); a tube 11 mm OD by 145 mm long had about 5 ml capacity. The outside diameter of the capillary tip, *B*, influences the range of droplet sizes that can be produced. Three holes, *G*, of