Organ Position-Ventral Scute Relationship in the Water Moccasin (Agkistrodon piscivorus leucostoma), with Notes on Food Habits and Distribution

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During June and July of 1968, 30 (17 males and 13 females) specimens of *Agkistrodon piscivorus leucostoma* were collected from three man-made ponds in southern Love County, Oklahoma. As an adjunct to a parasitological survey of this series, 23 specimens were dissected and the relative positions of the visceral organs with respect to ventral scute position (numbered anterior to posterior) were recorded.

Snake morphology and structural relationships have been studied by some early workers (Kellicott, 1898; Beddard, 1906; Thompson, 1914), but little is known concerning the presence or absence of internal differences in visceral position between species. Only one study was encountered which indicated visceral position relative to ventral scute counts (Garrigues, 1962).

The 17 male water moccasins average 74.97 cm (snout-vent)/87.71 cm (total) in length, while the 13 females average 67.13 cm (snout-vent)/77.63 cm (total) in length for the four which were nongravid and 64.22 cm (snout-vent)/74.39 cm (total) for the other nine.

The general arrangement of the internal organs was typical of most snakes. The right lung was extensive and functional (left, reduced and nonfunctional) and there was a gradual decrease in vascularity caudad. There was no discernible junction between esophagus and stomach; measurements for the stomach were not made for this reason.

The organs of the gravid females were pushed considerably anterior (in comparison to the others) due to the developing embryos. The right oviduct had generally more embryos (4-5) than the left oviduct (2-3) and reached to the level of the gall bladder.

The positions of the individual organs were determined by counting the ventral scales and correlating scale number with organ position. Table I indicates the average locations of the various organs; these locations are shown diagrammatically in Figure 1. It was difficult to be sure of the exact positions of certain of the organs (lung, pancreas, spleen, ovaries) since there is a considerable amount of connective tissue which has to be removed in order to expose them.

It was apparent that the organs, except for the kidneys, were located more cranially in the female. This finding corresponds with the findings of Bergman (1961) for *Coluber radiatus*. The position indicated for the gonads in females includes the entire genital tract, since determination of the exact length of the ovaries was not possible.

TABLE I. POSITION OF THE ORGANS IN *Agkistrodon piscivorus leucostoma* AS DETERMINED BY VENTRAL SCALE NUMBER (MEAN VALUES TO NEAREST WHOLE NUMBERS).

Number of Specimens	Males (12)	Nongravid Females (3)	Gravid Females (8)
Total number of ventral scales	136	137	137
Lung	15-98	16-98	14-95
Heart	49-54	46-51	46-50
Liver	55-78	52-76	52-75
Gall bladder	88-91	86-89	82-85
Pancreas	91-93	88-90	85-86
Spleen	91	88	86
Stomach	—88	—89	—82
Intestine	88-136	89-137	82-137
Gonads:			
Right	99-102	93—	88—
Left	104-107	100—	98—
Kidneys:			
Right	108-126	109-127	110-127
Left	111-127	113-127	113-127

Table II gives the lengths of the respective organs; these lengths are shown diagrammatically in Figure 1. The lengths in both sexes, with the exception of gonads, were similar. The longer intestine in the gravid females is probably due to pushing of the stomach anteriorly by the pressure of the developing embryos in the oviducts. In comparing the intestine lengths of snakes which contained food, it was found that gravid females, in most cases, had a longer intestine. It would appear, therefore, that stomach contents do not markedly affect the position of the pylorus.

Asymmetry was evident in both females and males, where the left reproductive tract and left kidney were shorter and more posterior.

The food records obtained from these snakes represent one small population and thus indicate the variety of foods taken from those available.

Seventeen of the 30 (57%) water moccasins had some type of remains in their digestive tracts representing all of the available classes of vertebrates plus some insect and plant material.

Mammalia: 1 snake— a hispid pocket mouse *(Perognathus hispidus)*.

Aves: 1 snake— Carolina chickadee *(Parus carolinensis)*; 1 snake— an adult female cardinal *(Pyrrhuloxia cardinalis)*.

Reptilia: 1 snake— 2 juvenile yellow-bellied water snakes *(Natrix erythrogaster transversa)*; 1 snake— egg shells of turtle.

Amphibia: 4 snakes— bullfrog *(Rana catesbeiana)*, one in the process of being eaten; 1 snake— unidentified frog remains.

Pisces: 2 snakes— catfish *(Ictalurus* sp.)

Insecta: 1 snake— beetle larva *(Coleoptera)* and ground beetle *(Galerita* sp.); 1 snake— Odonata remains. The beetle larva and ground beetle were in the same stomach with a bullfrog.

Plant material: 5 snakes— leaves and blades of grass. Associated with the Odonata remains in one snake.

An interpretation of these food records indicates that the water moccasin selects a broad spectrum of foods. It is very possible the plant remains were ingested accidentally along with animal food, and that some insect remains might have been from frogs taken as food.

This population of water moccasins represents a new locality for the western limits of the range of this species in Oklahoma.

TABLE II. LENGTH OF THE ORGANS IN *Agkistrodon piscivorus leucostoma*, IN TERMS OF THE CORRESPONDING NUMBER OF VENTRAL SCALES.

Number of Specimens	Males (12)		Nongravid Females (3)		Gravid Females (8)	
	Range	Mean	Range	Mean	Range	Mean
Lung	69-86	79.00	81-82	81.67	74-90	79.67
Heart	4-7	5.54	5-7	6.00	4-6	5.13
Liver	22-30	25.23	24-26	25.00	22-27	24.25
Gall bladder	3-7	4.61	4-5	4.33	3-5	3.75
Pancreas	2-3	2.85	2-3	2.67	2-3	2.75
Spleen	—	1.00	—	1.00	—	1.00
Intestine	47-53	49.91	45-55	50.00	51-60	56.50
Gonads						
Right	3-5	3.75	43-57	50.00	48-54	51.16
Left	3-4	3.17	37-40	38.50	40-43	41.25
Kidneys						
Right	15-20	18.33	16-20	18.33	15-22	17.88
Left	14-19	16.33	15-16	15.67	14-18	15.50

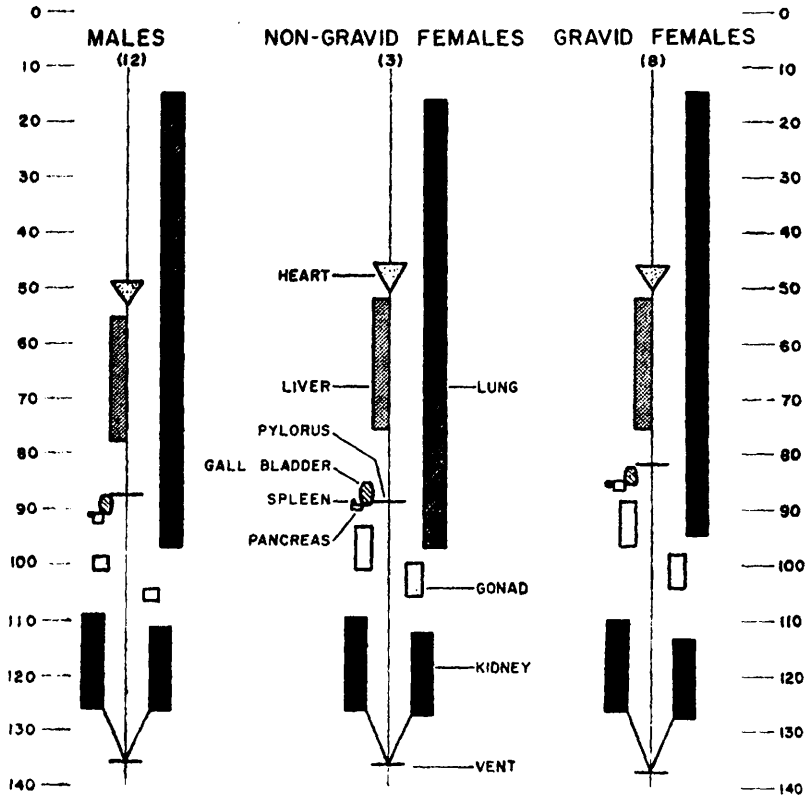

Figure 1. The position of the visceral organs in the water moccasin *(Agkistrodon piscivorus leucostoma)*, relative to ventral scale counts, for 23 specimens. The straight, thin, line represents the digestive tract. The liver lies on the left side.

Literature Cited

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