

tration of sulfanilamide in the blood of rabbits following its percutaneous administration is as high as that obtained after its oral administration, but inferior to the concentration following subcutaneous or intramuscular injections. (b) The blood concentration of sulfanilamide in men following its percutaneous administration is lower than that after oral administration, but vomiting is much more rare and less severe.

The percutaneous use of sulfanilamide may serve as an auxiliary method of chemotherapeutic treatment in certain cases.

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Skeletal Abnormalities of Short Spined Turkeys.

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In the course of examining turkey embryos that failed to hatch, mutants with typically shortened necks and bodies (Fig. 1) were found. These embryos varied in that some had an apparently normal head while others had a reduced skull, eyes, and upper beak. None of the affected embryos hatched.

The mutation was found in a closely inbred strain of the Bourbon Red variety of turkeys. Three segregating families gave a ratio of 59 normal to 14 abnormal, which is reasonably close to the numbers expected (54.75:18.25) on the basis of a ratio of 3 normal to 1 abnormal. Thirteen short spined and 98 normal embryos were obtained from an untrapnested pen of related birds. Of the 27 short spined embryos the sex was observed for 22, of which 12 were males and 10 were females. The mutation is, therefore, a simple autosomal recessive.

Skeletal Abnormalities. Fully developed embryos were selected for further study from eggs of similar size. The bones were freed from tissue, measured, extracted, dried, and ashed.*

The leg and wing bones of the short-spined embryos are normal in length and thickness (Table I, Fig.2). The head is likewise normal, whereas the neck and body are much reduced in length.

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FIG. 1.
Short spined turkey embryo.

The neck vertebrae are close together but the number of cervical vertebrae, 13 + the atlas, is the same as in normal turkey embryos. The reduction in the length of the body is also due to the crowding together of the vertebrae. There is thus a striking similarity to the short spine mutation of Mohr and Wriedt¹ in cattle.

The leg and wing bones of the short spined embryos had about

TABLE 1.
Measurements on Bones of 29-day-old Turkey Embryos of Approximately Similar Average Weights.

Bone or Structure	Avg maximum lengths				Avg widths at middle of bone			
	Normal embryos		Short spined embryos		Normal embryos		Short spined embryos	
	No.	Length, mm	No.	Length, mm	No.	Width, mm	No.	Width, mm
Femur	12	22.0	4	23.1	12	1.84	4	1.95
Tibia	12	32.4	4	34.8	12	1.94	4	2.00
Tarsometatarsus	12	24.3	4	25.6	12	2.22	4	2.38
Humerus	12	16.6	4	17.9	12	1.63	4	1.38
Ulna	12	15.7	4	15.8	12	1.23	4	1.19
Radius	12	14.6	4	15.3	12	0.73	4	0.74

¹ Mohr, O. L., and Wriedt, C., *J. Genet.*, 1930, **22**, 279.

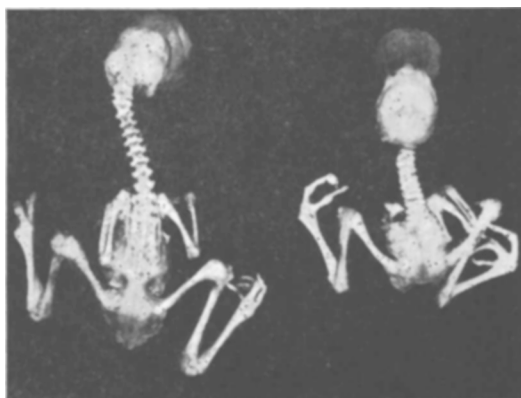


FIG. 2.

Skeletons of 29-day-old turkey embryos (normal—left, short spined—right).

the same dry weight, amount, and percentage of ash as the corresponding bones of normal turkey embryos (Table II). This was also true of the coracoid. The scapula and the ilium had a smaller amount and lower percentage of ash, while the ischium had a lower percentage of ash than the same bones in normal embryos. The pubis of the short spined embryos differed much less from normal than the other pelvic bones.

Discussion. The mutation reported in this paper has an extreme effect on both the gross morphology and composition of a restricted part of the skeleton. It thus differs in its effect on structure from certain mutations such as the creeper which in the homozygote affects all parts of the body (Landauer²).

TABLE II.
Average Dry Weight of Bones and Average Ash in Bones of 29-day-old Turkey Embryos.

Bone or Structure	Normal embryos				Short spined embryos			
	No. analyzed	Dry wt in mg	Ash		No. analyzed	Dry wt in mg	Ash	
			Wt in mg	%			Wt in mg	%
Femur	7	40.9	14.2	34.7	4	45.1	15.3	32.8
Tibia	7	69.1	24.5	35.5	4	85.7	27.7	31.9
Tarsometatarsus	7	45.8	15.7	34.3	4	59.9	19.6	33.6
Humerus	7	18.4	5.5	29.9	4	20.3	5.4	26.2
Radius-ulna	7	14.1	4.2	29.8	4	14.1	4.4	31.6
Coracoid	7	8.7	2.4	27.6	4	8.9	2.4	27.6
Scapula	7	6.9	2.7	39.1	4	6.1	1.9	28.3
Ilium	7	19.7	7.9	40.1	4	21.4	6.9	32.2
Ischium	7	7.5	2.6	34.7	4	12.5	2.6	22.5
Pubis	7	2.6	0.8	30.8	4	1.5	0.4	28.6

² Landauer, W., *Proc. 7th Internat. Genet. Cong.*

The wing bones of the normal and abnormal 29-day-old turkey embryos had a lower percentage of ash than the leg bones. This agrees with data for embryos of the domestic fowl of comparable age and perhaps indicates that this may be true for embryos of all gallinaceous species and perhaps all Aves. Since Weakley and Dustman³ found only slight differences between the percentage of ash in the humerus and femur of 5-week-old chicks, the wing bones presumably calcify more rapidly than the leg bones after the birds hatch.

Summary. A simple autosomal recessive lethal mutation that causes crowding together of the vertebrae with consequent shortening of the neck and body is described. The percentage of ash in the wing and leg bones was approximately the same as in the normal embryos, but the percentage of ash was less in the scapula, ilium, and ischium than in the corresponding bones of the normal embryos.

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Sex Differences in Pigment Content of Harderian Glands of Mice.

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Recent data^{1, 2} have shown that the Harderian glands of female mice of the C₃H strain show two characteristics that differ from those glands found in male mice of the same strain: (1) under normal light the exposed Harderian gland of a female, when stretched upon a microscope slide in a fresh or semidried state, shows a greater degree of "gray" pigmentation, and (2) under ultraviolet light (General Electric BH4) the glands from female mice tend to show a greater intensity of red fluorescence, thus indicating perhaps a higher concentration of porphyrins. (By differential solubilities, HCl numbers and spectroscopic data it has been shown that the porphyrin present in mouse Harderian glands is protoporphyrin.)

³ Weakley, C. E., Jr., and Dustman, R. B., *J. Agric. Res.*, 1939, **58**, 711; *W. Va. Bull.* No. 294, 40 pages, 1939.

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¹ Figge, F. H. J., Strong, L. C., Strong, L. C., Jr., and Shanbrom, A., *Cancer Research*, 1942, **2**, 335.

² Strong, L. C., and Figge, F. H. J., *Science*, 1941, **94**, 331.