1927 to 1929, she became increasingly interested in zoology and thoroughly demonstrated her scholarship, enthusiasm, and teaching ability. Her paper on hermaphroditism in the frog shows the thoroughness of her work in this period.

In 1929 she was awarded the Mary E. Woolley Fellowship by Mount Holyoke College and went to Columbia University, where she began work in experimental embryology in the Department of Anatomy. In her second year at Columbia she was awarded a graduate fellowship from that university and also was appointed instructor. In this capacity she continued her own investigations and gave laboratory instruction in medical histology from 1929 through the summer session of 1931. A part of the next year was devoted to an investigation in the Department of Ophthalmology the results of which were included in papers on the embryology of Amblystoma, published with H. B. Adelmann. She received her doctorate from Columbia University in 1933. Her published papers from that study, some of them with S. R. Detwiler, are concerned with the growth of engrafted embryonic spinal cord of Amblystoma.

In the autumn of 1933 Dr. Shapiro began work in the Department of Biological Sciences at Hunter College, becoming assistant professor in 1937 and serving as chairman of the Department from 1941 to 1944. Although heavy administrative duties were added to her teaching, which included courses in embryology, comparative anatomy, and general zoology, she found time to continue research with her husband, Harry L. Shapiro, on the development of the tooth germs in the mammal.

Up to the time of her death she continued to plan for further study and for her return to her students at Hunter College.

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Technical Papers

A Possible Avian Analogue of the Scrotum

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The phenomenon of heat-induced sterility is a familiar one and long has been noted as a characteristic of all species of mammals that have been studied from this viewpoint (*1*). Similarly, in insects where this trait has been sought its presence has been demonstrated, as in *Drosophila* and *Ephestia.* Indirect and some direct evidence has suggested the presence of heat-induced sterility in the remaining major groups of terrestrial animals.

Because nothing was known regarding the possible existence of this phenomenon in reptiles, these animals were tested in our laboratories for the trait, and it was clearly demonstrated in the first species studied, *Xantusia vigilis* (*2*). Because reptiles were a key group in the origin and evolution of birds and mammals, the presence of this character, even in the highly specialized modern forms, is of considerable interest.

With regard to birds, Riley (*3*) has reported that spermatogenesis in the English sparrow takes place intermittently and that the time of greatest spermatogenic activity is confined to the last hours of the night, when the body temperature is at its lowest level. This is consonant with the theory of heat sensitivity of the germ cells and suggests the need for more extended studies on the thermo-spermatogenic relationships in birds.

Because of the apparently universal occurrence of a heat-induced sterility resulting from the dual standard of heat tolerance, it has been proposed (*1*) that the phenomenon may have played a dominant part in the evolution of most or possibly all terrestrial animals, and that thus it was logical to suggest the possibility that, whatever other factors might have been involved, the predominant influence in archosaurian extinction might have been the result of overheating. If this can be substantiated by future studies of paleoclimates, this dramatic event may provide us with additional and important support for the proposal that this dual thermal capacity has extended to archaic animals and is not a new feature.

Because birds retain many characteristics that are reptilian and because they operate at the highest temperatures known among the vertebrates, yet have internally located testes, they have posed a serious question which was only partially answered by Riley's studies.

Attempts to measure the presumable existence of a temperature differential between the testes and the rest of the body so far have failed. In view of Riley's findings, this lower temperature in the region of the testes is not a necessary condition for normal spermatogenesis, but its presence would be a logical expectation. Up to the present we have ascribed this failure to demonstrate a lower testicular temperature to inadequacies in technique, but it is possible, though improbable, that no such differential exists. The improbability is based on the almost invariable thermal gradient between the hot-bodied bird and the cooler environment. Thus, if tropical species of birds have temperatures approximating those of their temperate-zone relatives, the favorable nature of the gradient would be 42–43° C. in the birds (often still higher when they are active) to 29–30° C., the mean annual air temperature.

Because of the failure in the physiological investigations it seemed advisable to re-examine the location of one of the morphological characteristics that might be credited with the hypothetical lowering of the testicular temperature, namely, the air sac system.

In order to obtain an accurate picture of the natural relationships of the visceral organs, the birds were not inverted to the usual position employed in anatomical studies or while being "sexed" during the preparation of scientific skins. Omission of this technique may have been the factor that has obscured the true relationships of testes to air sacs. While in their normal position the air sac systems of the birds used (*Euphagus cyanocephalus*, Brewer's blackbird) were injected with a latex solution.

These studies were continued over two successive seasons of the testicular cycle, and they clearly demonstrated that the testes move a short but important distance downward and backward, so that during the warm spring months while spermatogenesis is in progress *the testes become enveloped between the two dorsal folds of the abdominal air sacs.*

In this as in all other species of Nearctic birds a late spring or summer testicular regression takes place, and the behavior of the organs strongly suggests that the insulating or cooling propensities of the air sacs are not fully adequate to prevent some heat damage, but a sufficient measure of relief is accorded the birds to enable them to reproduce before collapse of gonads takes place.

The entire performance so closely resembles the picture of heat-induced collapse in other animals that it has been deemed advisable to continue similar studies in order to determine whether this similarity is superficial, a result of light changes, or mere coincidence, or whether it is genuine heat effect. It is believed that prolonged but moderate overheating will prove to be a major factor.

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Comparison of Some New Analgesic Compounds

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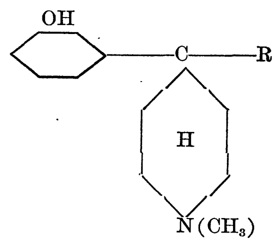
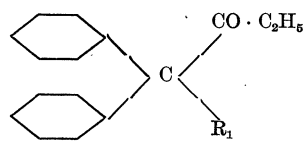
Knowledge of new analgesic agents prepared by German chemists has recently been published by the U. S. Department of Commerce (*4*). A number of these substances possess marked pharmacologic properties. A report on one outstanding member of this group has already been made from this laboratory (*5*). It is, chemically, 1,1-diphenyl-1-(dimethylamino-isopropyl)butanone-2 (German Serial No. 10820). However, other compounds in the series appear to have good possibilities and deserve further study, particularly from a clinical point of view. The following is a brief comparison of six of the compounds with demerol and 10820. As shown by the following structures, three of them are closely related to 10820, and the other three, to demerol. In fact, demerol is identical with 10446 except that it has no OH-group in



(I)

R $= COO \cdot C_2H_5$	[10446]
$= CO \cdot C_2H_5$	[10720]
$= CO \cdot CH_3$	[10726]



(II)

$R_1 = CH_2 \cdot CH(CH_3) \cdot N(CH_3)_2$	[10820]
$= CH_2 \cdot CH_2 \cdot N(CH_3)_2$	[10582]
$= CH_2 \cdot CH_2 \cdot N\langle$ H $\rangle O$	[10581]
$= CH_2 \cdot CH(CH_3) \cdot N\langle$ H $\vert$	[10819]

the metaposition of the benzene ring. The substances other than demerol, designated by their original German numbers, were prepared by Drs. T. P. Carney and E. Rohrmann, of our organic chemical department.

Methods. Analgesic action was determined in rats

[1] Thanks are due Francis W. Israel for technical assistance in this study.