gel dried down to less than 3 per cent. moisture content had imbibed at the end of 72 hours 6.45 grams of water per gram dry gelatin as contrasted with 4.30 grams water for a 40 per cent. gel similarly treated. Comparable differences were observed when the dried sheets were ground and uniform sized particles sieved out and tested for hydration rate and maximum hydration capacity.

Our experiments indicate that gelatin gels have a structure and that this structure is fixed at the time of gelation and is not appreciably altered by drying the gel at room temperature. A crystal structure in which the gelation temperature is actually the melting point of the crystals would explain the peculiarities observed.

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The control of respiration.

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The movements of respiration are carried out by voluntary muscles and ought to obey the laws of voluntary movement. One of the chief points in muscular action is the dependence of motor response on sensory impulses. Without the guidance of sensory impulses movements are ataxic. Just how ataxic or abnormal movements become depends on the extent of loss of sensory impulses and on the ability of the mechanism to guide itself by sensory impulses from other sources. These statements hold true in regard to the movements of respiration. It has long been known that a modified respiration results from cutting off the sensory impulses from the lungs by section of both vagi. Many investigators have, however, kept animals with divided vagi so that one cannot maintain that the vagi are essential to respiration. However, it was pointed out by one of us[1] a number of years ago that animals with vagi divided are not nearly as efficient in times of respiratory stress as is a normal animal. It was shown by

[1] Scott, F. H., *Jour. of Physiology*, 1908, xxxvii, 301.

Alcock, Einthoven and others that expansion of the lungs sets up electrical variations in the vagus, thus showing these sensory impulses actually exist. A number of years ago we[1] called attention to the alteration in respiration after section of the cord or division of the posterior thoracic roots. That impulses are set up in the joints of the thoracic cage every time the thorax expands may be shown by connecting the peripheral end of a cut intercostal nerve to a string galvanometer. There is an electrical variation each time the thorax is expanded. The respiratory center is thus informed of the position of the thorax as well as the position of the lungs. We will discuss in detail at a later time the effects of these impulses on the respiratory center.

One of the means of testing ataxic muscle is to have it do certain movements more strenuous than normal. The respiratory mechanism may be tested in this manner with either increased CO_2 or decreased O_2 in the air. We finally adopted the method of rebreathing. By this method we found animals with divided vagi or with divided cord are much less efficient than normal animals. In a number of cases we found in animals with divided cord that rebreathing from the spirometer caused a marked slowing of respiration. The respirations always increased in depth but the animals were unable to make a deep and at the same time a rapid respiration. In no case after division of the cord did we find an increase in rate nearly proportional to that in the intact animal. As examples two experiments may be quoted:

	Rate.	Vol.	Total c.c. per Min.
Cat, normal	40	61.6	2464
After 1 min. rebreathing	50	75.6	3780 = + 53%
Cord cut 7th cervical 17 min. after operation	37	40.7	2030
After 1 min. rebreathing	30	47.6	1628 = − 19%
Cat, normal	39	50.4	1965
After 1 min. rebreathing	48	75.6	3628 = + 84%
30 minutes after division of vagi	15	75.6	1134
After 1 minute rebreathing	15	106.4	1489 = + 39%
15 minutes after division of cord at 7th cervical	15	56	840
After 1 minute rebreathing	15	70	1050 = + 25%

[1] Gault, C. C., and Scott, F. H., *Am. J. of Physiology*, 1918, xlv, 555.