than six months without appreciable influence on the vitality of the organisms in question.

The ordinary manifestations of life cease at zero, but at -190°C . we have every reason to suppose that intra-cellular metabolism must also cease, as a result of the withdrawal of two of its cardinal physical conditions, heat and moisture.

It is difficult to form a conception of living matter under this new condition, which is neither life nor death, or to select a term which will accurately describe it.

It is a new and hitherto unobtained state of living matter—a veritable condition of *suspended animation*.

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RESISTANCE OF SEEDS TO HIGH TEMPERATURES¹.—

Various experimenters have investigated the limits of temperature which spores of the lower plants and animals can withstand. The results they have obtained show that these spores, if dry, can germinate after exposure to the lowest temperatures obtainable, while the upper limit for similarly dried spores lies between 100°C . and 130°C .

For seeds of the higher plants also it has been more recently shown that the lowest temperatures available are without harmful effects. This note contains an account of some experiments on the maximum temperatures which seeds can withstand and after which they will retain their germinative power.

Before exposure to the high temperatures the seeds were either desiccated over sulphuric acid, or dried in an oven the temperature of which was gradually raised to 90°C . After desiccation the seeds were exposed for at least one hour to the higher temperature. After exposure the seeds were sown on moist sand. The following temperatures were obtained as the highest after exposure to which the seeds of the species mentioned could germinate:—

<i>Mimulus moschatus</i>	. 105°C .	<i>Medicago sativa</i>	. . 121°C .
<i>M. luteus</i>	. . . 112°	<i>Avena sativa</i>	. . 118°
<i>Papaver somniferum</i>	. 100°	<i>Hordeum distichum</i>	. 118°
<i>P. nudicaule</i>	. . 100°	<i>Cucurbita Pepo</i>	. . 112°

¹ Abstract of paper read before Section K of the British Association, Belfast, 1902.

<i>Meconopsis cambrica</i> .	100° C.	<i>Helianthus annuus</i> .	112° C.
<i>Schizopetalon Walkeri</i> .	105°	<i>Pisum sativum</i> .	112°
<i>Brassica Rapa</i> .	110°	<i>Trigonella Fenum-graecum</i>	90°
<i>Eschscholtzia californica</i>	110°	<i>Lotus tetragonolobus</i> .	110°
<i>Lactuca sativa</i> .	114°	<i>Convolvulus tricolor</i> .	120°
<i>Helianthus argophyllus</i>	110°	<i>Nicotiana Tabacum</i> .	112°
<i>Lolium perenne</i> .	110°	<i>Galtonia candicans</i> .	105°

Seeds of *Lagenaria vulgaris* and *Heracleum giganteum* were unable to germinate after exposure to a temperature of 90° C.

The seeds of any one species show considerable individual differences in their power of resisting high temperatures. Thus a large percentage of a sample of seeds, say of *Avena sativa*, will germinate after exposure to a temperature of 100°–105° C., while only a very small percentage will germinate if exposed to 118° C.

The time needed for germination is increased by exposure to temperatures near the maximum. In a general way the higher the temperature to which the seeds are exposed the longer will be the period of germination.

Long exposure to a comparatively low temperature may prove more fatal than a short exposure to a high temperature. Thus seeds which will germinate successfully after one hour's exposure to 110°–120° C. will not germinate after twelve days' exposure to a temperature of 95°–97° C.

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THE EFFECT OF TEMPERATURE ON CARBON DIOXIDE ASSIMILATION¹.—This investigation differs from any which have preceded it on the same subject in the attention paid to uniformity in the environment of the leaves *before* the experiment. Recent work has shown that both the assimilation and the respiration of a leaf depend on its previous nutrition and temperature. For this reason a separate leaf was used for each temperature, care being taken to keep them for some time under exactly similar conditions.

Leaves of the Cherry Laurel (*Prunus Laurocerasus*) were employed throughout.

¹ Abstract of paper read before Section K of the British Association, Belfast, 1902.

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