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? WHY THE WEATHER ? Mailed January 29, 1930.

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SYNTHETIC ATMOSPHERES

The air we breathe normally contains, besides a variable amount of water vapor, about 78 per cent. nitrogen, 21 per cent. oxygen, 1 per cent argon, a fraction of 1 per cent. carbon dioxide and minute amounts of neon, krypton, xenon, helium, and other gases. Organic life has been evolved to breathe an atmosphere of this composition, and, in general, any marked change in composition is harmful or fatal. It is however a problem of immense interest to learn what limits of variation can be tolerated by animals, especially man, and also whether some change from the normal composition might be beneficial rather than harmful.

Researches bearing on this problem have been conducted in recent years by Prof. J. Willard Hershey, of McPherson College, Kansas, who has produced a wide range of "synthetic atmospheres" in his laboratory and noted their effects on animals confined in them. One of the most surprising results of these studies is that animals die in a few days when confined in an atmosphere composed of nitrogen and oxygen, in normal proportions, but without carbon dioxide and the rare gases, such as argon, helium, neon, and krypton.

On the other hand, an atmosphere consisting of 79 per cent. helium and 21 per cent. oxygen permitted normal life, while in one consisting of 75 per cent. argon and 25 per cent. oxygen the animals not only survived but appeared to be stimulated and benefited by breathing it for a period of ten days!

If these experiments are confirmed their results may be revolutionary. Not only may synthetic atmospheres be used (as the ~~nitrogen~~-helium atmosphere devised by the U.S. Bureau of Mines is already used) by divers and caisson workers, to shorten the "decompression" process, but aeronauts may carry a supply of prepared atmosphere aloft with them, sailors may use such atmospheres in submarines, and, last but not least, synthetic atmospheres more healthful and invigorating than natural air may be breathed habitually in buildings---where already the air-conditioning engineer controls the physical characteristics of the atmosphere.

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