exhibition of perfect system under law. If the earth has its barren ice-fields about the poles, and its deserts no less barren toward the equator, they are not accidents in the making, but results involved in the scheme from its very foundation.

V. GEOGRAPHICAL DISTRIBUTION OF PLANTS AND ANIMALS.

The geographical distribution of plants and animals is dependent on both physical and biological conditions.

1. *Temperature* has universal influence. Species are usually confined within narrow temperature limits. They differ therefore in the different zones from the equator to the poles, some having a range of only a few degrees, and others of half a hemisphere. They differ also with the height on passing from the sea level to the limit of life (the limit of perpetual snow) about the summits of the highest mountains, or even higher, as regards Microbes or Bacteria, the lowest of cryptogamous plants, the only kinds having the range of the world. They also differ as we descend in the ocean.

2. *Light* is another universal cause. Some species need for successful growth and reproduction the direct rays of the sun; others are confined to shady places, dark places, and very dark places, like caves; some to the surface waters of the ocean, because of the light that penetrates them, and others to dark depths. A lawn will have a rich surface of grass in the sunshine, and become full of weeds under the shade of a tree, because the weeds flourish in the shade, while the grass dwindles and becomes crowded out; and in such a case fertilizers may help only the weeds instead of the grass.

3. *Difference in pressure.* — This cause also is universal in its action, but very feeble in its effects. The atmospheric pressure near the earth's surface diminishes about one pound per square inch for each 1900 feet of ascent, or, approximately, three pounds for 6000 feet. In the ocean, the pressure increases at the rate of about one pound per square inch for each 2·2 feet of descent, or 2750 pounds for 6000 feet or 1000 fathoms, and 11,000 pounds for 24,000 feet.

But marine species readily become adapted to all pressures, as the outside water penetrates them. Twenty-six fishes are known to have a range of 5400 feet, and some macrural Crustaceans a range of more than 12,000 feet. The Shrimp, *Sergestes mollis*, for example, ranges from 2238 to 17,694 feet.

But after a sudden change, or when brought to the surface in a dredge, a fish presents "a most disreputable appearance," the swimming bladder protruding from its mouth, the eyes forced from their sockets, and the scales fallen off (A. Agassiz).

4. *Differences in moisture and dryness of climate* are great sources of limitation in the range of species. Differences in soil have wide influence; for a soil must contain the materials essential to a plant's growth before it will