

umbilicarias depend on the large amount of starchy matter in their composition. They have, as the *Cetraria Islandica*, however, a bitter principle possessed of purgative properties. But perhaps the most singular of all are the *Lecanora esculenta* and *L. affinis* which frequently, under extraordinary circumstances, have served as food for large numbers of men and cattle in various countries from Tartary in Asia to Algeria in Africa. Large tracts of country in the above mentioned places repeatedly appeared to be covered suddenly with a layer sometimes from three to six inches thick. The inhabitants believing it to have come from heaven called it a kind of manna and imitated their flock in time of scarcity by eating it. Some writers have supposed that the manna of the Israelites consisted of one or other of these lichens. Several "rains of manna" of this genus have been described as occurring in Persia and in neighboring countries. It is usually found in the form of small lumps, from the size of a pin's head to that of a pea or small nut, greenish or whitish in color, hard, irregular in form, without odor and tasteless. They appear to have no base of attachment, consequently they are supposed to grow by deriving the whole of their nourishment from the air, and probably may have grown while falling to the ground.

This lichen manna has fallen as 'rain' or has been found suddenly covering tracts of country in Persia, the steppes of Tartary, the country

about the Altai and Caucasus, near Sebastopol and other parts of the Crimea, on Ararat, near Damascus, in Algiers and in the African Sahara. In 1829, during a war between Russia and Persia, a large portion of country around a town on the southwest shore of the Caspian was covered by a shower of this manna-rain while the inhabitants were reduced to famine. The sheep were noticed to eat it greedily. The idea immediately occurred to the starving inhabitants, who soon found that it could be converted into agreeable and nutritious bread.

If we want to test the value of a lichen as an article of food, we can do so quite simply. The amount of starch or mucilage in its composition is an approximate measure of this value. Take a certain amount of clean thallus, powder it, or cut it up into small pieces place it in a vessel with hot water, keep it hot for some time, varying both heat and duration to discover the best conditions for the experiment. On allowing this liquid to cool, it gelatinizes more or less firmly according to the amount of gelatinous substance in the specimen. The *Pulmonaria Sticta* has a considerable amount of this material in its large and easily collected fronds, and may when properly cooked form an agreeable article of diet. This starchy mucilaginous material was applied some years ago by the ingenious Lord Dundonald to calico-printing with very good success.