Introduction

The lichen is perhaps the widely distributed flora of the climatic zones of the world. Its distribution on the surface of this earth is latitudinally from arctic to antarctic and longitudinally from 0-180° both east and west. Apparantly humble plant, but most strong enough to adapt itself to any extreme environmental conditions of heat and cold, drought and wet climate. They are known to be growing on arctic and alpine waste covering desert rocks as pioneer invaders engaged in mighty task of creating a niche for the growth of other plants. They themselves need no soil; but for the growth of other plants they catch a rock with their powerful acids and disintegrate it. Further the process of soil formation eventually enables other plants to grow. In this respect, ecologically they can be considered as pioneer invaders of any new area. Despite the such interesting and amazing characteristic features of lichens, they are neglected plants of botanical study. Only in the recent years when their chemical analysis was made, it projected light on their potentiality of trapping mineral elements emerging out of the carburettor of automobile like a fire ball throwing in the atmosphere.

Wherever lichens grew in such areas, they trapped the particles of elements dispersed in the ambiant atmosphere, no matter whether needed for their own growth or not, whether

toxic or nontoxic. Since then lichens have been considered as indicators of environmental pollution. It is necessary to emphasize here that when we refer to as indicator, essentially the plants prefer to grow in such areas, but it is not applicable to lichens. In other words lichens do not preferably grow in such areas, but when they are growing they have an ability to clean the atmosphere at the time of gas exchange. In the process the elemental particles are filtered out and piled up in the tissue. This leads to argue that lichens are truthful and faithful indicators of atmospheric pollution.

There are more than twenty thousand species of lichens distributed all over the world (Ahmadjian and Hale, 1973) growing in almost all environmental conditions. The enquiry as to how they are able to grow may tell us that, possibly, it is by virtue of their origin, for they are one of the best examples of symbiants. We understand that the lichens are formed by symbiotic association of algae and fungi, the autotrophs and heterotrophs respectively. Although voluminous work has been done in recent years on this aspect, their very association endows this organism with wide range of adaptation. There are different algal systems which are associated in the process of lichenization. The main being blue green algae. Similarly amongst the fungi the main ones are ascomycetes which are in large number and secondly basidiomycetes. Lichens obviously do not have the root system, but, they have rhizoidal

hyphae or rhizines. Alternatively simple mechanism exists where by they are able to attach themselves by clasping little particles of substrate what is called fastening themselves to the substrate depending upon the nature of the substrate over which they are growing. The rhizines are known to form by tuft of individual hyphae not connected with one another; but as to what extent they can transport dissolved minerals or organic metabolites from the substrate to the thallus has not yet been thoroughly known. However, it is noteworthy to bring out here that, whether or not, the rhizines or that part which fasten the thallus to the substratum help absorbing nutrient, one thing is true that it is not the algal origin but fungal origin which is heterotrophic in nature. The extensive growth, development and proliferation is only of fungus which leads us to classify whether the lichens are ascolichens or otherwise.

Lichens are classified as corticolous (growing on leaves and bark), Terricolous (growing on ground) and Saxicolous (growing on rock). Similarly based on their form they are recognised into large group of crustose, foliose and fruticose. However, there are types which are filamentous and their hyphae are hair like with short thin branches; and yet, some are gelatinous lichens which form two extra groups and therefore, they are not included in above category. Irrespective of their smooth form of thallus and habitat they may be of ascolichens or basidiolichens.

The main objective in the present investigation is, therefore, to examine ascolichens which are widely growing in and around Satara both in the forest and on the rocks. The three genera which have dominant distribution in the forest area adjoining Satara such as Kas, Yawateshwar, Bamnoli and Mahableshwar are Usnea, Parmelia and Leptogium. Out of which Leptogium has blue green alga Nostoc is a phycobiont while both Parmelia and Usnea have green algae Trebouxia sp. is a phycobiont (Richardson et al., 1968). However, all the three species are foliose lichens growing on the bark of the tree. Because of their external growth of thalli and the rhizoidal rhizines which fasten to the bark, they have a tendency of accumulating many minerals either dispersed in the atmosphere where they are growing or absorbing through rhizoidal rhizines from bark (!). Since Mahabaleshwar being a hill station there is a lot of human activities and automobile traffic. As a result, the atmosphere appears to have lot of pollutant emerging out through the carburettor of the vehicles. Therefore, in this problem efforts have been made to study the mineral constituents of the thalli of these types growing at different localities.