Oscillatoria rubescens D.C. as an Indicator of Lago Maggiore Eutrophication

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Introduction

Oscillatoria rubescens D.C. for a long time has been considered one of the most typical algal species for eutrophic and artificially eutrophicated lakes and has become, among other Cyanophyceae, a biological indicator of changing trophic conditions.

This planktonic Cyanophyceae species was observed, for the first time, in 1825 in Murtensee (Switzerland), where it produced a reddish algal bloom which gave origin to its German name: ‘Burgunderblut-Alge’; its Latin name was given in 1825 by De Candolle [5] who described this alga. Toward the end of the last, and at the beginning of the present century, Oscillatoria rubescens appeared, for the first time, in the following Swiss lakes: Baldegersee, Halwilersee, Zürichsee, Zugersee and Rotsee. During and after the Second World War, the Vierwaldstättersee, and Lake Lugano (Lago di Lugano) were invaded by this alga (for example, see: [1, 10, 13, 14, 17, 18]). Up to-day, Oscillatoria rubescens is known to occur in many other eutrophicated European, American and Japanese lakes and reservoirs. In Italy Oscillatoria rubescens was found in Trentinian lakes Caldonazzo and Levico [11, 12], but until some 15 years ago this alga was not observed in the larger Insubrian lakes.

Della Croce [6] found Oscillatoria rubescens for the first time in Lake Maggiore (Lago Maggiore), but according to Vollenweider [21], who studied the phytoplankton of the lake during the same period, the identification of this species, at that time, was uncertain because the Oscillatoria rubescens colonies were strongly damaged. This fact seemed to testify that Oscillatoria rubescens was not able to reproduce in Lake Maggiore and, probably, has been carried down into Lake Maggiore by the River Tresa from Lake Lugano. In following years, Tonolli [19] observed that this alga had reached a certain importance, particularly in the northern basin of the lake.

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Recent observations

During monthly observations on plankton of the Ispra Bay (Lake Maggiore) as a part of the research program of the Biology Service of Euratom, *Oscillatoria rubescens* was observed at the end of 1966 (Fig. 1). During this study a considerable increase of the population density of *Oscillatoria rubescens*, compared with that of other algal species, was seen. For this reason plankton collections were extended to different zones and depths of Lake Maggiore and, subsequently, a program was established to study the seasonal cycles of phytoplankton. The present note reports some preliminary observations.

![Fig. 1. Oscillatoria rubescens D.C.](image)

**Spatial and vertical distribution**

On 13 October 1967, samples of surface water were collected from different zones of Lake Maggiore, River Tresa and Lake Agno (Lake Lugano). The results reported in Fig. 2 show that *Oscillatoria rubescens* was present, but was low in the River Tresa and Lake Agno. Microscopical examination clearly indicated that *Oscillatoria rubescens* was perfectly alive and, in contrast with the situation of some 10 years ago, it can be concluded that now this alga does reproduce actively in Lake Maggiore,