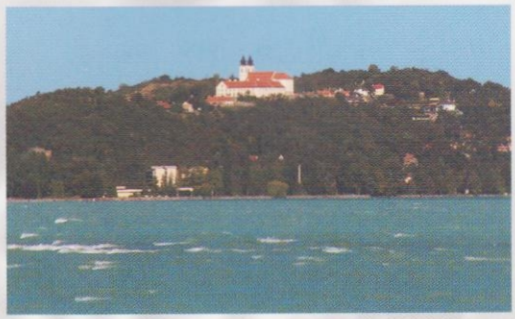

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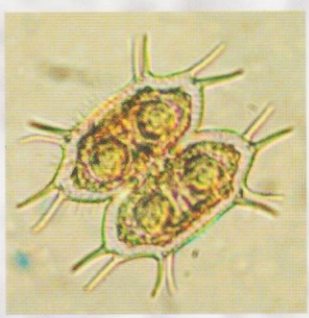

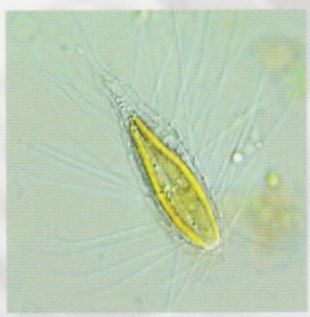

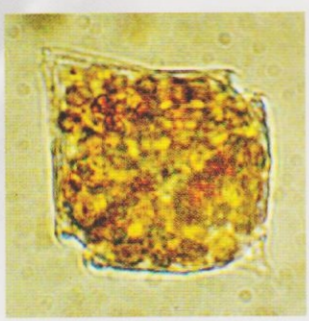

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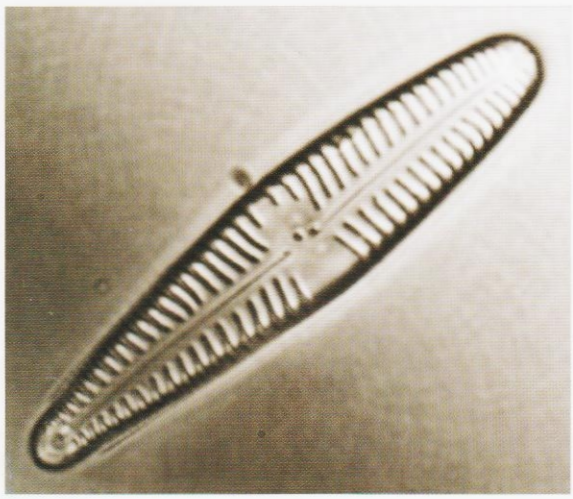

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Factors affecting the seasonality and distribution of phytoplankton in a large lowland river in northern Italy (River Adige)

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Models explaining temporal phytoplankton changes in lakes cannot be fully applied to rivers because of important differences in the factors controlling species selection and planktonic development. Moreover, the assessment of water quality based on the phytoplankton abundance in rivers is much more difficult to interpret because of the greater dependence from water discharge. The objective of this work is to assess the influence of the principal physical, chemical and biological (grazing) factors on the seasonal dynamics and distribution of phytoplankton in the lowland course of River Adige (north-east Italy). The river has a watershed of 12100 km^2, a length of 409 km and higher mean monthly water discharges between May and July (250-400 $m^3 s^{-1}$). The samplings were carried out with monthly frequency at three stations along a 25 km stretch of the river from September 1997 to July 1998. Phytoplankton biovolume was dominated by single celled diatoms (mainly *Cyclotella* spp. and small pennates) followed by Cryptomonadales and thin Oscillatoriales. Other algal orders that developed with sizeable biovolume included a few Peridiniales, Ochromonadales and Euglenales, and diverse Chlorococcales. The temporal development of the dominant groups followed a comparable pattern at the three stations, whereas some significant differences were detected especially in the less abundant groups. Algal development did not seem constrained by nutrients; total and reactive phosphorus showed concentrations always greater than 60 and 20 µg P L^{-1}, whereas dissolved inorganic nitrogen never dropped below 1 mg N L^{-1}. On the contrary, algal abundance showed a significant and negative correlation with water discharge and mineral turbidity. In particular, after the higher abundances attained during early spring, the whole phytoplankton community came to a sudden collapse in May, during higher water influx and high mineral turbidity. The only algal group able to maintain or increase its abundance during or after higher flood events was represented by the Cryptomonadales (*Cryptomonas* spp. and *Plagioselmis nannoplanctica*). Macrozooplankton (copepods and cladocerans) was always detected with low densities; higher abundances (<1500 ind. m^{-3}) were reached only during the phytoplankton maxima. The results obtained in this work show that water discharge and mineral turbidity in River Adige are influential in controlling phytoplankton development through advective losses and light limitation, with a relatively minor role played by nutrient availability and zooplankton grazing.