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# STUDY OF SOME GREEN ALGAE "ACCIDENTALLY" INTRODUCED IN ROMANIA

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***Abstract***

*Most algae have great importance for all humanity and the biosphere in general. They are important sources of proteins, soil materials and fertilizers, and also bioindicators of soil condition, depolluting agents (accumulation of radioactive isotopes); algae-based fertilizers can inhibit the growth of phytopathogenic agents (Şchiopu, 2008). Algae provide good results in testing the nutrient supply in soil and the remanence of toxic substances resulted from pesticide use. They could also be used in bioreactors to generate various chemicals from hydrogen to biodiesel or cosmetics.*
*The presence of algae, known as invasive, has devastating effects as they affect biodiversity of the ecosystems in which they grows, which requires their control (possession, sale, transport).*
*This study draws attention to the uncontrolled introduction in Romania of some algae known to be invasive.*

***Key words:*** *algae, invasive.*

## INTRODUCTION

At present, many seaweed species are imported for aquarium decoration. They are used for their decorative appearance (as they do not spread chaotically within the fish basin) and for their capacity to remove nutrients (particularly the nitrates), unfixed to the substrate.
Some algae, such as the marine green alga *Caulerpa taxifolia*, are invasive and can get out of control, causing serious environmental problems and affecting biodiversity.
*Caulerpa taxifolia*, originating in the Indo-Pacific region, developins dynamic populations that successfully replaces the previously existing algal associations. It was firstly discovered in the Mediterranean Sea in 1984, near the Principality of Monaco, probably resulting from the emptying of the Monaco Oceanographic Institute tanks. Its rapid spreading along the Mediterranean coasts of France and Italy led to the replacement of the local associations of benthic organisms on the extremely varied substrates, which affected the native fauna.
In the recent years, populations of this alga have been reported on the Adriatic coast and the Balearic Archipelago. The occurence of this alga on some points of the North-American costal region - Florida and California - raises new problems, especially since the genetic analysis of the material occurred in California indicated that it was the same strain as the Mediterranean one.
It is assumed that the presence of this alga in Southern California in 2000 was most likely caused by an aquarium owner who had thrown the contents of a fish basin into a sewage system for rainwater. California has passed a law that prohibits the possession, sale or transport of *Caulerpa taxifolia* within the state.
The *Caulerpa taxifolia* invasive strain can tolerate very cold water and can colonize most substrate types. It is a toxic alga due to the presence of poisonous substances produced in a large quantity.

## MATERIALS AND METHODS

For identification and description purposes, we used preserved material belonging to six species of green marine algae, brought to Romania as fresh material for aquarium decoration purposes. Macroscopic observations were performed on the algae with the help of algology determinators and treatises, and microscopic observations were made on numerous thalli cross sections of the studied algae. Observations were carried out with a microscope ML-4M IOR belonging to the

laboratory of Biology, USAMV Bucharest. The photos were taken with the digital camera Panasonic Lumix DMC - LS60 (6MPX, 3X optical zoom).

## RESULTS AND DISCUSSIONS

Macroscopic and microscopic studies have shown the presence in Romania of six species of green marine algae belonging to the Class Chlorophyceae: *Chaetomorpha antennina*, *Cladophora aegropila*, *Chaetomorpha spiralis*, *Caulerpa taxifolia*, *Codium fragile*, *Codium vermilara*, used for aquarium decoration purposes.

*Chaetomorpha antennina*
This alga belongs to the *Cladophoraceae* family.
It is consists of an unbranched filamentous thallus (Figure 1) and it is thick with large cylindrical cells, numerous nuclei and parietal chromatophores.

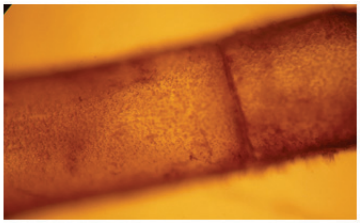

Figure 1. Chaetomorpha antennina – microscopic image

C*haetomorpha spiralis*
This alga belongs to the *Cladophoraceae* family.
It has unbranched filamentous thallus and it is thick, with cylindrical cells, large and numerous nuclei (Figure 2).

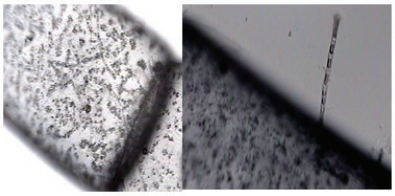

Figure 2. Chaetomorpha antennina – microscopic image

It has propagules that can be detached from the thallus.

C*ladophora aegropila* - (marimo balls)
This alga belongs to the *Cladophoraceae* family. Its thallus is filamentous (Figure 3), with erect branched filaments, composed of cylindrical, elongated, multinucleate cells; its filaments form spheres.

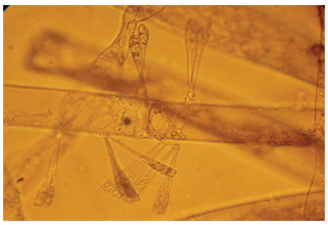

Figure 3. Cladophora aegropila– microscopic image

It presents propagules that can be detached from the thallus.
*Caulerpa taxifolia* ('killer algae', 'silent killer')
This alga belongs to the *Caulerpaceae* family.
The thallus (Figure 4) is formed of a uniaxial cladomes system, composed of a cylindrical portion (a continuous shaft) which is stoloniferous, repentis, branched, perennial, called kauloid, and develops phyloids - flattened formations similar to green leaves, providing chlorophyll assimilation. It attaches itself to the substrate with its branched rhizoids (Peterfi and Ionescu, 1979).

Figure 4. Caulerpa taxifolia

Its thallus is crossed by numerous cylindrical beams (Figure 5) that are perpendicular to the surface.
*Codium fragile* (Dead Man's Fingers)
This alga belongs to the Codiaceae family. It has a pseudoparenchymatous (Figure 7), uncalcifying thallus, and spongy consistency. It forms detachable propagules (Figure 6).
It presents tubular, filamentous cells, with dense colourless woven filaments (Figure 8) and peripherally arranged vesicular growths, rhizoids and vertical kauloids.

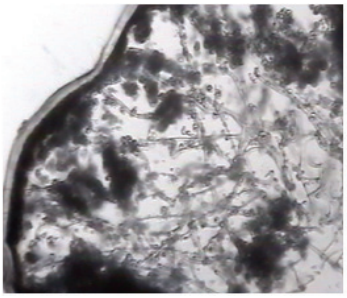

Figure 5. Caulerpa taxifolia - microscopic image

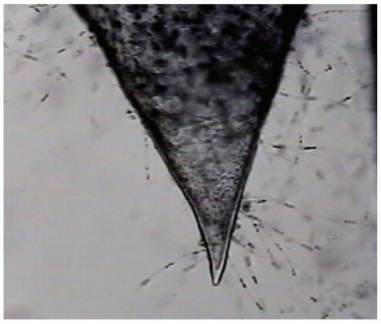

Figure 6. Caulerpa taxifolia – microscopic image

Figure 7. Codium fragile – microscopic image

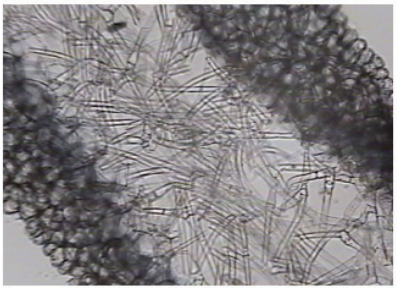

Figure 8. Codium fragile – microscopic image

The terminal branches of the filaments are arranged on the surface of the thallus. The alga presents propagules that can be detached from the thallus.

*Codium vermilara*

It is a green marine algae (Figure 9).

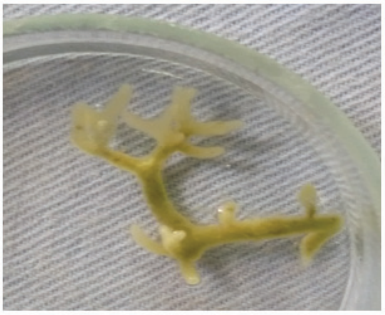

Figure 9. Codium vermilara – microscopic image

Its thallus is pseudoparenchymatous (Figure 10) and uncalcified.

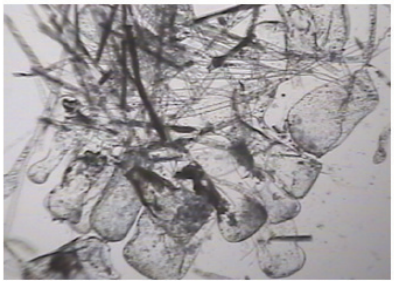

Figure 10. Codium vermilara – microscopic image

## CONCLUSIONS

Among algae uncontrolled introduced in Romania are included the invasive algae, such as *Caulerpa taxifolia* wich can colonize different types of substrates and causes serious environmental problems.

The lack of legislation in this regard, leads, sooner or later, to irreversible damage to biodiversity within ecosystems where this algae species develops.

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