

**EXPERIMENTAL WORKS REGARDING THE EARLY STAGES GROWTH AT  
*Ancistrus brevipinnis* (REGAN, 1904) AND *Corydoras aeneus* (GILL, 1858),  
UNDER SOME STRESSING FACTORS INFLUENCE**

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**Abstract.** This paper presents the results obtained by the authors in experimental trials, concerning the assessment of the main environmental factors (temperature, pH, light), of two exotic species, *Corydoras aeneus* (GILL, 1858) and *Ancistrus brevipinnis* (REGAN, 1904) (BREZEANU, 1972; SANDERS, 1993; SEGNERH & VERRETH, 1958) studied and reared in the Constanta Aquarium laboratories. The experiments proved that the maintaining of these parameters at greater or lower values than normal has as effect the slowdown of fish growth. Consequently water temperatures maintaining at 32°C, comparing with the normal ones (23 and 28°C), the pH reducing at 5-5.5 (normal values being 6 to 8) had obvious influences on the decrease of the studied species growth. Continuous lighting proved to have a lower influence on fish; even these species prefer dark conditions, they felt this danger and started to group in the darker corners of the basins.

**Keywords:** Aquarium, environmental factors, exotic fishes, captivity, stress.

**Rezumat. Experimente de dezvoltare a stadiilor timpurii la speciile *Ancistrus brevipinnis* (REGAN, 1904) și *Corydoras aeneus* (GILL, 1858) supuse unor factori stresanți.** În această lucrare, autorii evidențiază principalii factori de mediu (temperatura, pH-ul, lumina) implicați în creșterea a două specii exotice luate în studiu, *Corydoras aeneus* (GILL, 1858) și *Ancistrus brevipinnis* (REGAN, 1904), factori, care menținuți la valori mai mari sau mai mici decât cele normale, încetinesc creșterea peștilor. Astfel, temperaturi ale apei de 32°Celsius (normal fiind 23-28°C), pH diminuat la 5-5,5 (față de valorile normale de 6-8), au avut influențe evidente în reducerea creșterii speciei *Corydoras aeneus* (GILL, 1858) și *Ancistrus brevipinnis* (REGAN, 1904). O influență ceva mai redusă s-a dovedit a o avea iluminatul non-stop, peștii, deși iubitori de întuneric, au sesizat acest pericol, cantonându-se pe la colțurile bazinelor mai puțin iluminate. Scăderea concentrației de oxigen sub valorile normale, determină apariția de radicali liberi ai acestuia, nocivi organismului.

**Cuvinte cheie:** Acvariu, factori de mediu, pești exotici, captivitate, stres.

## INTRODUCTION

Stress conditions are very numerous: temperature oscillations, improper chemistry, fish tiredness due to transport, recurrent manipulations, recurrent treatments, population's high density in the basin, life carried inside a small volume of water, populating the same basins with fish of different sizes, lengths, nutritional lacks, traumas, improper lighting, etc. These factors may act solitarily, but they usually act together. There are situations when their slow and prolonged involvement leads to the accommodation at imposed conditions, but stressors usually bring negative influences (ROȘCA, 1977).

## MATERIAL AND METHODS

The species *Ancistrus brevipinnis* (REGAN, 1904) is part of Loricariidae family, which is the richest species from all siluriformes (about 23% out of all species) and the fifth in the hierarchy of the families with the most numerous species from all teleosteans (about 3% from all species), holding 818 species, more than 104 species from the genus *Ancistrus* (NELSON, 2006) (Table 1).

The exotic species *Ancistrus* sp. (Fig. 1) entered Romania in the spring of 1984 and was first proliferated in 1985. This species was important in GDR [German Democratic Republic], together with other exotic fish species, as *Poecilia sphenops* (VALENCIENNES, 1846) and *Symphysodon aequifasciatus* (PELLEGRIN, 1904).

Table 1. Systematic appraisal of the species *Ancistrus brevipinnis* (REGAN, 1904).  
Tabel 1. Incadrarea sistematică a speciei *Ancistrus brevipinnis* (REGAN, 1904).

<b>Class:</b> Actinopterygii 	<b>Order:</b> Siluriformes 	<b>Familia:</b> Loricariidae 
<b>Subfamily:</b> Ancistrinae 	<b>Genus:</b> <i>Ancistrus</i> 	<b>Species:</b> <i>A. brevipinnis</i> (REGAN, 1904)
Synonyms: <i>Xenocara brevipinnis</i> REGAN, 1904		
Species from the same genus: <i>Ancistrus</i> sp. (REGAN, 1904)		

The exotic species *Corydoras aeneus* (GILL, 1858) is part of Callichthyidae family (Table 2), which includes 198 species and 186 from *Corydoras* genus; *Corydoras aeneus* species (GILL, 1858), known as "catfish", is one of the most popular species bred in aquariums (Fig. 2).

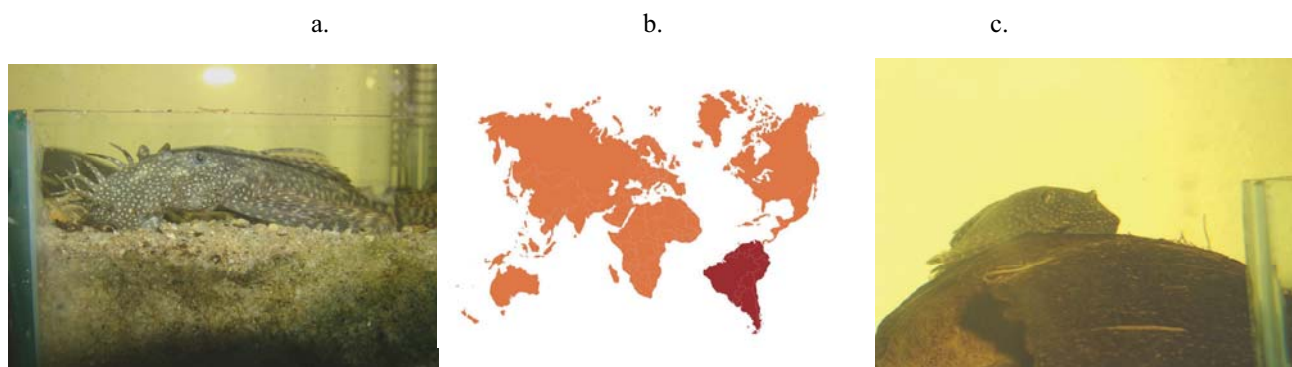


Figure 1. Specimens of *Ancistrus brevipinnis* (REGAN, 1904): a. male; b. geographical distribution of species; c. female (original).  
 Figura 1. Exemple de *Ancistrus brevipinnis* (REGAN, 1904): a. mascul; b. distribuția geografică a speciei; c. femelă (original).

Table 2. Systematic appraisal of the species *Corydoras aeneus* (GILL, 1858).  
 Tabel 2. Incadrarea sistematică a speciei *Corydoras aeneus* (GILL, 1858).

<b>Class:</b> Actinopterygii	<b>Order:</b> Siluriformes	<b>Family:</b> Callichthyidae
<b>Subfamily:</b> Corydoradinae	<b>Genus:</b> <i>Corydoras</i>	<b>Species:</b> <i>C. aeneus</i> (GILL, 1858)
Synonyms: <i>Callichthys aeneus</i> (GILL, 1858), <i>Corydoras aeheus</i> (GILL, 1858), <i>C. aenaenus</i> (GILL, 1858), <i>C. macrosteus</i> (REGAN, 1912), <i>C. microps</i> (EIGENMANN & KENNEDY, 1903), <i>C. schultzei</i> (HOLLY, 1940), <i>C. schultzei</i> (HOLLY, 1940).		
Species of the same genus: <i>Corydoras</i> sp. - 186		

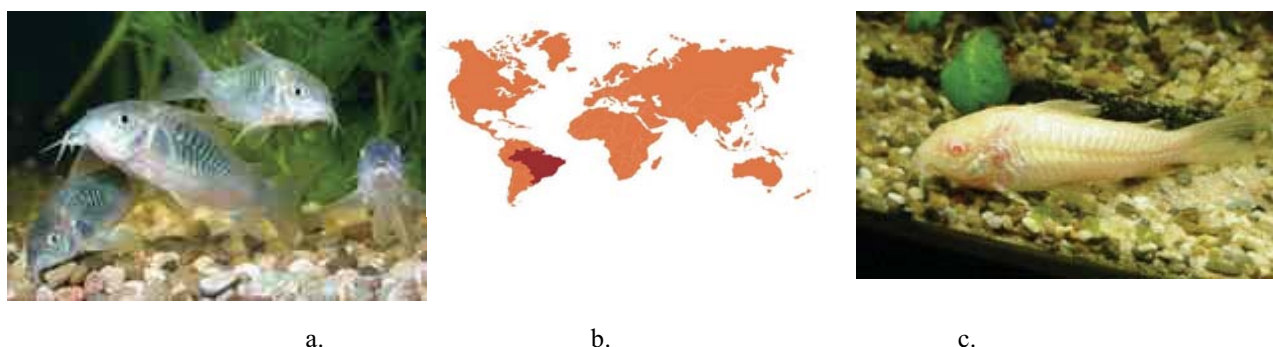


Figure 2. Specimens of *Corydoras aeneus* (GILL, 1858): a. classical shape;  
 b. geographical distribution of the species; c. albino variety (original photo).  
 Figura 2. Exemple de *Corydoras aeneus* (GILL, 1858): a. forma clasică;  
 b. distribuția geografică a speciei; c. forma albinoasă (original).

In order to study exotic fish growth under stress conditions produced by the variation of three important environment indicators like abnormal temperatures, pH changes and lighting, there were used:

- 80 samples of *Corydoras aeneus* (GILL, 1858), each sample having an average weight of approximately 1.5 g 6 months old;

- 80 samples of *Ancistrus brevipinnis* (REGAN, 1904), with about 0.3 g/sample average weight, 4 months old.

The *Corydoras aeneus* (GILL, 1858) and *Ancistrus brevipinnis* (REGAN, 1904) samples were split in groups of 20, while other 20 samples made up the control group variant (C).

For a period of 30 days, the experimental groups were reared under environmental parameter changes, nominated stressing factors, in the following way:

- one group was exposed to high temperature (32°C);

- one group was exposed to an acid pH (Ph = 4.5-5.5);

- one group was exposed to continuous lighting (day and night) for the whole period (30 days).

So, each group was exposed under one single parameter variation. The other conditions of life regarding technical and technological aspects (precincts size, water volume, development stages, feeding regime, etc.) were identical.

In order to be able to observe separately the evolution of each sample from the two studied species, *Corydoras aeneus* (GILL, 1858) and *Ancistrus brevipinnis* (REGAN, 1904), one sample was introduced in 5 litre aquarium volume, in bubbling water. For testing the behaviour of organisms under pH variations, it was used a 120 litre aquarium, split by vertical glass walls, so that these 20 samples to be launched individually in each side of the experimental vessel. The aquarium was equipped with an external filter, which held inside the product that induced the pH variation. By these

several environmental factors changing, it was planned to be observed the way of accommodation/adapting conditions of each one to the new life conditions, and also their influence on fish growth and then on their reproduction.

There were made morphological measurements of the experimental samples and it was counted the growth ratio of each species. The aim of these was to evaluate the rearing of early stages of the studied species in different conditions and the impact of different stressors on their growth (BOGATU & MUNTEANU, 2003; COCIU, 1999; OPREA et al., 2000; SEGNER & VERRETH, 1958; SANDERS, 1993).

## RESULTS AND DISCUSSIONS

Temperature, pH and light are ones of the most important abiotic factors. Their sudden variation, during a certain amount of time, subjects the organism to a shock, so that survival, or of the aquatic animals have a lot to suffer.

For the *Corydoras aeneus* (GILL, 1858) the following individual weights were recorded at the beginning of the experiment (Table 3).

Table 3. *Corydoras aeneus* (GILL, 1858) main body measurements in experimental conditions.

Tabel 3. *Corydoras aeneus* (GILL, 1858) utilizați în experimentările de stres.

No.	Parameters	Minimal weight (g)	Maximal weight (g)	Average weight (g)
1.	Control group	1.250	2.250	1.522
2	pH	1.020	2.560	1.555
3.	Temperature	1.130	2.400	1.635
4.	Light	1.080	2.440	1.639

For the control groups and for the group reared in acid pH environment, the average weights was about 1.5 g/sample at the start of the experimental period, and for those reared at a higher temperature of 32°C and also at continuous lighting regime, the average weights were about 1.630 g/sample.

After 30 days of growing in stressful conditions, caused by those three variables, there have been registered differences of fish growth between experimental groups (Fig. 3).

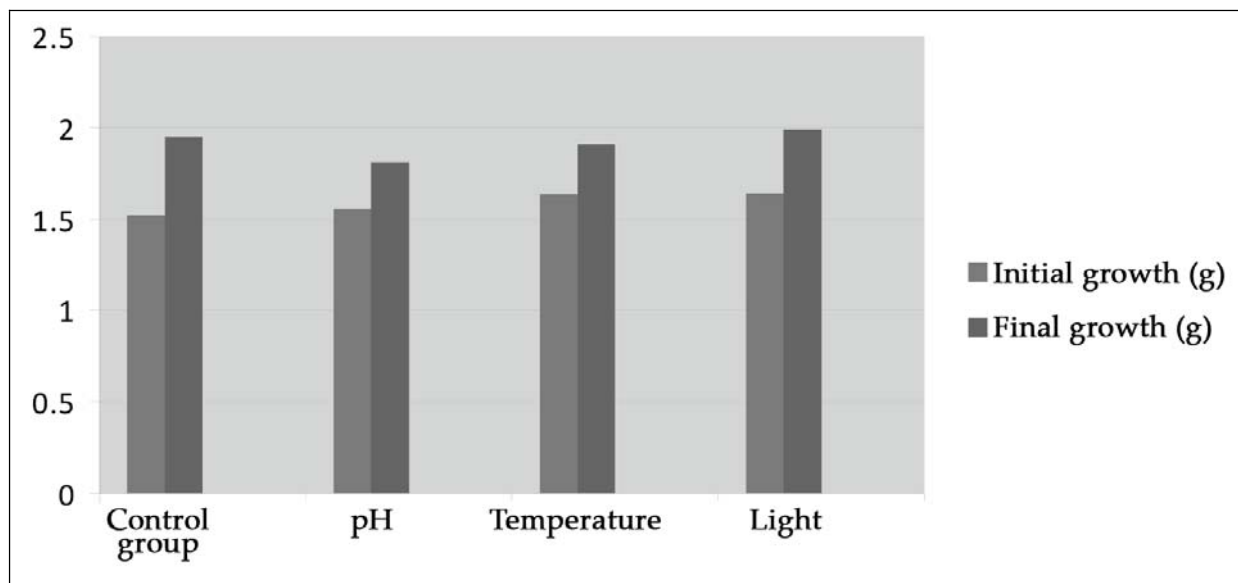


Figure 3. Growth of the species *Corydoras aeneus* (GILL, 1858) living in stress conditions (medium values).

Figura 3. Creșterea speciei *Corydoras aeneus* (GILL, 1858) în condiții de stres (valori medii).

The samples from the control group and those stressed by temperature and the continuous lighting recorded the highest individual weights (as average values), slightly superior with 1.99 g/sample, while the samples from the group living in substantially reduced pH (comparing to the normal values for this species), grew less, the individual average value amounting 1.810 g/sample.

Analysing the rate of growth in all experimental variants, it clearly results that the control group had the most significant growth, its average value reaching 0.427 g/sample (Fig. 4).

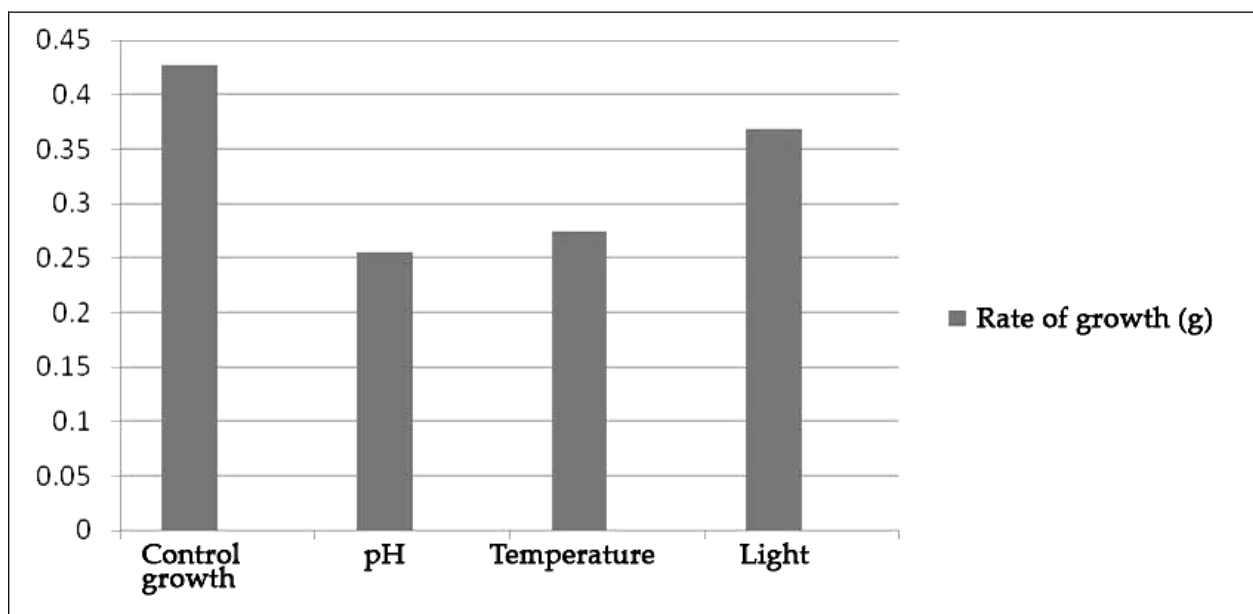


Figure 4. The growth rate recorded to *Corydoras aeneus* (GILL, 1858) reared under stressing factors.  
 Figura 4. Sporul de creștere înregistrat la specia *Corydoras aeneus* (GILL, 1858) supusă unor factori stresanți.

The most important influence on the studied species growth was produced by water acidity, followed by temperature and lighting changes. The average values of the rates of growth were 0.255 g/sample for the group living in acid pH environment, 0.275 g/sample, for those reared to higher temperature (32°C) and 0.369 g/sample for the fish developed in continuous lighting conditions. Although, being a benthic species, fond of dark environment, its samples managed to refuge near the aquarium walls, in less lightened areas, so that continuous lighting variant less affected the organisms. In the other case of high temperature and low pH, the fish were more stressed and their growth was seriously slowed down. For these groups, there were also observed a diminished appetite and a slight state of agitation.

Referring to the *Ancistrus brevipinnis* (REGAN, 1904), the values of the individual weights were the following, at the beginning of the experiment (Table 4).

Table 4. *Ancistrus brevipinnis* (REGAN, 1904) main body parameter used in stress experiments.  
 Tabel 4. *Ancistrus brevipinnis* (REGAN, 1904) utilizat în experimentările de stress.

No.	Parametres	Minimal weight (g)	Maximal weight (g)	Average weight (g)
1.	Control group	0.210	0.570	0.305
2.	pH	0.230	0.870	0.302
3.	Temperature	0.120	0.640	0.225
4.	Light	0.170	0.810	0.319

The *Ancistrus brevipinnis* (REGAN, 1904) small stages had an average weight around 0.3g/sample, excepting the fish group which was planned to be reared at higher temperature than the maximum registered in their traditional environment, where the organisms weighed 0.22 g/exemplar, average value.

After the growing period, in all three experimental variants under the stress conditions of life, caused by three parameter changes, as it was mentioned, pH reduction to 4-4.5, temperature growth up to 32°C and continuous lighting instead of normal ratio (16 hours light and 8 hours night), the following results were recorded (Fig. 5).

For the control group, as expected, the highest weight growth was recorded, the average value being 0.520 g/sample.

For the samples living in an environment characterized by a low pH and high temperature, the fish growth was substantially slow, as well as the average weight values registered, 0.410 g/sample and 0.360 g/sample.

The results of these experiments were more clearly highlighted when the rates of growth were analysed for each experiment category, separately (Fig. 6).

According with the previous graph, it is obviously shown the net dominance of the growth rate of *Ancistrus brevipinnis* (REGAN, 1904), at its control group level for which all normal life conditions of the species were ensured. In the other three variants, more reduced growing rates were registered, the growth being slower because of the stress caused by the acid pH variant, the much higher temperature than the normal value and the continuous lighting (the species having traditionally nocturnal activity). In these conditions, the average rates of growth were: 0.215 g/sample for the control group, 0.108 g/sample for the group with acid pH, 0.135 g/sample for the group with high temperature and 0.1705 g/sample for the fish group which was stressed by continuous lighting.

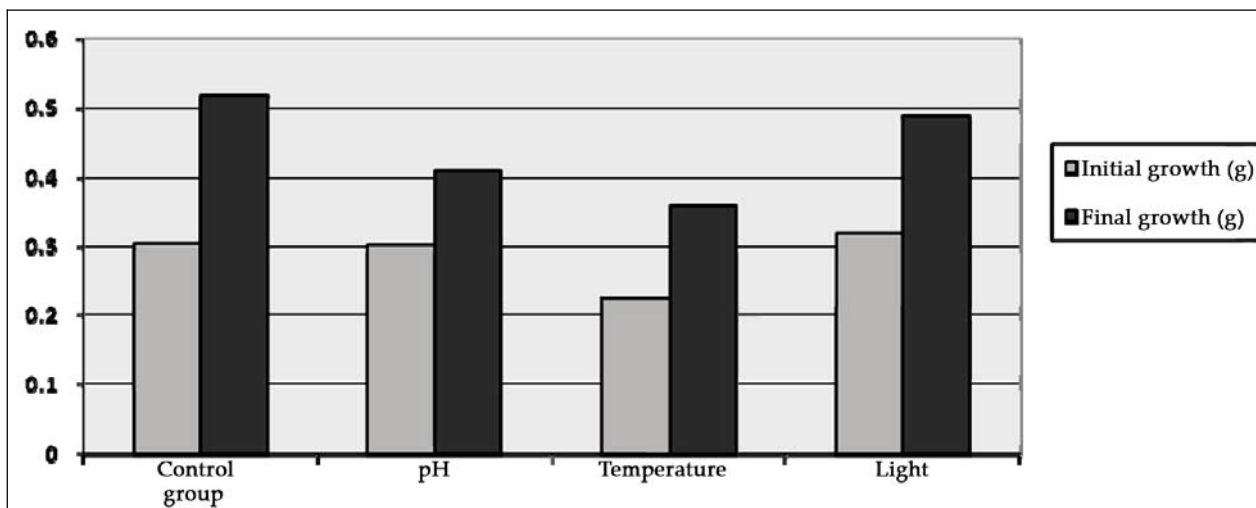


Figure 5. The growth registered at experimental species *Ancistrus brevipinnis* (REGAN, 1904), under stress conditions (average values).

Figura 5. Creșterea speciei *Ancistrus brevipinnis* (REGAN, 1904) în condiții de stres (valori medii).

### CONCLUSIONS

To conclude, it is mentioned that the main environment factors involved in the experimental studies of the *Corydoras aeneus* (GILL, 1858) and *Ancistrus brevipinnis* (REGAN, 1904) for early stages growing are temperature, pH and light regime. If they are changed and maintained at higher or lower values than the normal ones, they act as stressors for the small reared fish, causing body diminished growth, which is clearly rendered in tables and graphs. The main values of environment changing factors were 32°C water temperatures, 5-5.5 diminished pH compared with the normal 6-8, all influencing the reduction of evaluated species growth. It was emphasized that continuous lightning exerted a lower influence on fish samples; as the species prefer dark conditions, fish samples felt the danger and all grouped in the darker corners of the basins.

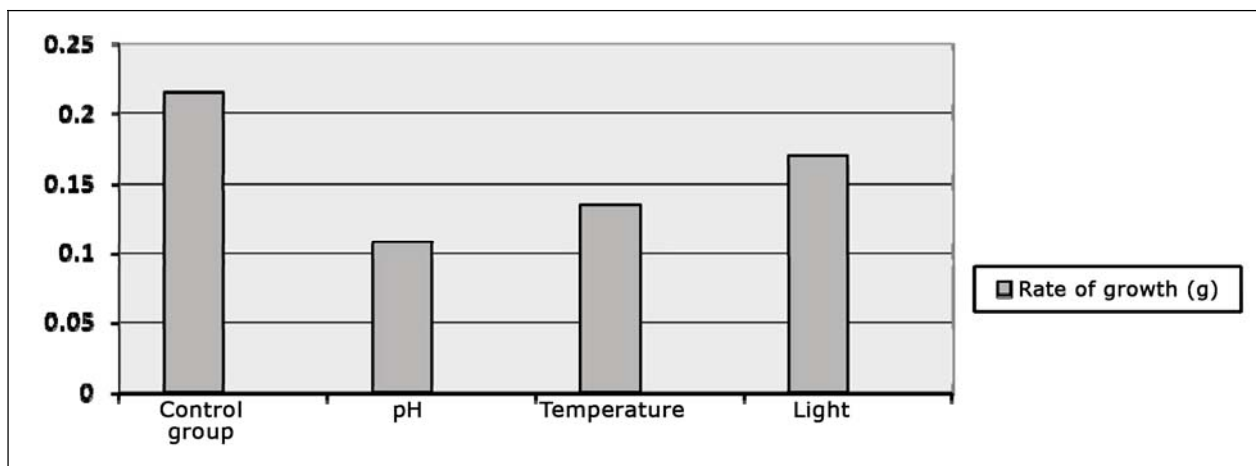


Figure 6. The growth rate recorded for *Ancistrus brevipinnis* (REGAN, 1904) reared under stressful factors.

Figura 6. Sporul de creștere înregistrat la specia *Ancistrus brevipinnis* (REGAN, 1904) supusă unor factori stresanți.

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