How transition metals affect algal external carbonic anhydrase

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Study aims

1) Effect of transition metals on the activity of external carbonic anhydrase (CA_e) of alga *C. reinhardtii*; 2) The ways of transition metals affecting alga CA_e.

Results and discussion

Our results are shown in the table below. The data have demonstrated that the extent of transition metals influencing CA_e is different and the magnitude in which these transition metals affect CA_e depends on the concentration. Transition metals influence the activity of CA_e by two ways: (1) directly operating on CA_e at cellular surface, (2) indirectly interfering in the metabolism of CA_e in algal cell.

	20μMOL/L		100μMOL/L	
	BEFORE	AFTER	BEFORE	AFTER
MN	136.1±2	239.5±1	91.6±8	57.4±3
FE	106.8±1	172.9±2	99.0±(	56.6±9
CO	118.6±1	160.1±1	84.6±(	78.4±1
NI	150.1±1	164.8±2	81.1±:	76.4±1
CU	77.3±1	96.4±2	51.6±1	66.1±1
ZN	77.2±1	99.7±1	55.2±8	90.4±8
CD	100.9±	136.8±2	59.7±1	81.5±

Significant difference $^{\#}$between metal-excessive (20μmol/L or 100μmol/L) and normal culture condition and *between "Before" and "After" (Tukey, $P<0.05$). "Before" is the relative activity of CA_e from *C. reinhardtii* that was exposed to transition metals for 24 hrs before extracting; "After" is the relative activity of CA_e that was exposed to transition metals after being extracted from *C. reinhardtii*.

Conclusions

Effect of transition metals on CA_e is species-specific. Cu and Ni affect CA_e by way (1); Zn by way (2); Cd by way (1) and (2); and Mn, Fe, and Co at least by way (1).

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References

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To harmonize the water resources system of Lake Taihu basin in China using circular economy notion

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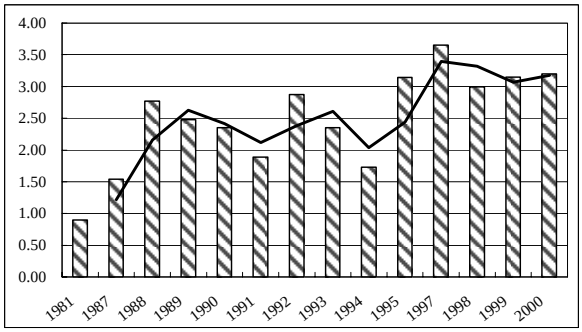
Lake Taihu basin is located at the south end of the Changjiang River Delta in China. In recent years GDP and finance incoming of this place is almost more than 10% of the total amount of the country, accounting only 0.4% for the areas and 3% for the population. It became one of the most developing and densely populated area. However, with the rapid economic development, the water resources system of Lake Taihu basin experiences a degenerate period from 1960. The water quality standard lowered 1 level every 10 years, and this is obviously more serious in recent years. How to control the degeneration in order to use water recourses more scientifically and efficiently is drawing great attention among researchers both in China and overseas.

Figure 1: Variation over past 25 years of total nitrogen (TN) in Taihu Lake in China (unit: mg/L)



It is believed that, to restore the degenerated water resources system of Lake Taihu basin, circular economy notion must be used and insisted on. It relates to all kinds of measures such as law, administration, engineering, economy, science and technology, etc. Here only two of them are emphasized as following. (1) Integrated management of water resources. (2) Insisting on “3R Principle”, saving and using water scientifically.