Chironomid larvae eating methane

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Carbon isotopic composition of animal body generally reflects that of food materials. Most of benthic invertebrates, inhabiting in the sediment of Lake Biwa, utilize and grow on organic matter in or sinking onto the sediment. Aquatic larval stages of chironomid midges are one of dominant groups of benthic invertebrates found in the surface sediment. To know the food web of benthic animals in Lake Biwa, chironomid larvae were collected from the sediment between 40m to 70m deep, and their carbon isotopic compositions were measured.

Larvae of two congenic chironomid species inhabiting sympatrically (*Stictochironomus akizuki* and *S. pictulus*) showed distinctly differrent $^{13}\delta C$ values. The $^{13}\delta C$ of *S. akizuki* larvae showed –35 to –25 ‰, being similar to the surface sediment, while *S. pictulus* larvae ranged from –55 to –70 ‰, which is rather close to the methane.

S. akizuki larvae have villus on the wall surface of anterior and posterial part of the intestine and no spetial microbes, while *S. pictulus* larvae have different microbes in the anterior and posterior part of intestine which has no villus on the wall surface.

Very low $^{13}\delta C$ values indicate that *pictulus* larvae may utilize methane indirectly by feeding on methane-oxidating bacteria in oxic-reductive boundary of the lake sediment, or directly by holding some symbiotic microbes in the intestine which is able to oxidize methane.

By tracer experiments with ^{13}C labeled methane, neither *akizuki* nor *pictulus* larval body were labeled, but the *pictulus* feces deficated in experimental bottles was strongly labeled.

Though experimental results are not conclusive, however, the evidences obtained so far indicate that the *pictulus* larvae certainly consume methane in one way or another in the lake sediment.

Geochemistry of wolframites from Portuguese ore deposits

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There are many occurrences of wolframite in quartz veins from northern and central Portugal and most of them have been exploited. Cassiterite and wolframite commonly occur in the same quartz vein. Cassiterite is associated with muscovite selvages, particularly along vein-schist contacts. Wolframite is distributed throughout the veins. Tin-tungsten deposits are commonly associated with Hercynian tin-bearing S-type granites. Some quartz veins with wolframite are associated with an I-type granite, which has a low tin content (Gerez mountain).

Wolframite compositions from thirty five ore deposits were obtained by electron microprobe. In eighteen ore deposits, wolframite has a dominant hübnerite component, while in seven ore deposits it presents mainly a ferberite component. Commonly some wolframite crystals show an homogeneous major element composition. In some ore deposits, some single crystals are zoned with a rim poorer in hübnerite content than the core; in other ore deposits, and more rarely, individual zoned crystals have an inverse zonation.

Table 1: Niobium and manganese contents of wolframite from five Portuguese ore deposits

Ore deposits	Nb_2O_5 wt.%	mol.% $MnWO_4$
Rebordosa	* - 0.58	5 - 54
Sabrosa	* - 0.63	18 - 21
Alvão	* - 0.69	16 - 56
Argozelo	* - 0.94	33 - 67
Panasqueira	* - 1.88	13 - 23

* - below the limit of detection.

Niobium was the only minor element, which presents significant content in wolframite, but just from five ore deposits (Table 1). The highest Nb_2O_5 wt.% content was found in Panasqueira wolframite. In general, wolframite from these five ore deposits has higher ferberite content than hübnerite content. However, Nb content up to 0.043 p.f.u. does not depend on the ferberite content of wolframite. A good negative correlation between W and Nb was found for over four hundred individual microanalyses from these five ore deposits. Only in two single wolframite crystals from Panasqueira, zoning was found for Nb and W contents. The rim is richer in W and poorer in Nb than the core. Therefore, during cooling the hydrothermal fluid becomes richer in W and poorer in Nb. The coupled substitution $W^{6+}Fe^{2+} \leftrightarrows Nb^{5+}Fe^{3+}$ probably takes place.