

The Food Web of Solar Lake (Sinai Coast, Gulf of Elat)

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Solar Lake is a hypersaline pool, stratified for about 9-11 months of the year. During stratification, the hypolimnion is characterized by the lack of oxygen, and temperatures there reach values of over 50° C, because of a hot-house effect. In the high summer (July-September) stratification disappears on account of evaporative concentration. During circulation, a homogenous salinity of ± 140 ‰ prevails. In the periods of stratification, the salinity of the epilimnion fluctuates between 60-90 ‰, while in the anaerobic hypolimnion it reaches 180 ‰.

The blue-green algae form mats (about 2 m thick) around the shallows of the lake. However, blue-green algae are actively photosynthesizing also on the 4-5 m deep bottom of the lake, during the anaerobic period (see COHEN, KRUMBEIN & SHILO, *this volume*). There are also several species of benthic diatoms. Photosynthetic bacteria are living in a stratum connected with the pycnocline.

The fauna — almost exclusively of continental origin — is qualitatively poor. Of the 16 species recorded, most live in the littoral algal mat. *Artemia* alone lives in the open waters, while the wet supra-littoral is inhabited by Pseudoscorpionidae, the staphylinide beetle *Bledius* sp. and the wood louse *Halophiloscia* sp. (see Table 1).

Table 1. FAUNAL LIST OF SOLAR LAKE

<i>Protozoa</i>	Ciliophora	<i>Insecta</i>	Ephemeroptera
	<i>Condylostoma</i> sp.		<i>Cloeon dipterum</i>
	<i>Euplotes</i>		Diptera
<i>Platyhelminthes</i> :	Rhabdocœla		<i>Ephydra</i> sp.
	<i>Macrostomum</i> sp.		Coleoptera
<i>Nematoda</i> :	1 small nematode species		<i>Bledius</i> sp. (Staphylinidae)
<i>Arachnida</i> :	Pseudoscorpionidae		<i>Eretes</i> sp. (Dytiscidae)
			<i>Enochrus</i> (Hydrophilidae)
<i>Crustacea</i> :	Anostraca		<i>Philydrus</i> sp.
	<i>Artemia salina</i>		
	Copepoda		
	<i>Robertsonia salsa</i>		
	<i>Nitocra lacustris</i>		
	Ostracoda		
	<i>Cyprideis littoralis</i>		
	Isopoda		
	<i>Halophiloscia</i> sp.		

Rapp. Comm. int. Mer Médit., 23, 3, pp. 133-134 (1975).

The blue-green algae and the diatoms form the food basis on which most animals live. Only in the case of *Artemia* is there evidence that they feed on bacteria. *Condylostoma* is known to feed on diatoms. Presumably, the nematode species also feed on diatoms. The two harpacticoid copepods feed on blue-green algae. *Mesostomum* is considered to feed on both types of organisms. In the wet supralittoral, *Halophiloscia* and *Bledius* feed on algal material — detritic or drying up after the water level recedes. The hydrophilid and dytiscid beetles are carnivorous. The larvae feed only on the herbivores of the algal mat. The adults roam freely in the water near the shore and attack also *Artemia*. In the supralittoral, the false-scorpions, Pseudoscorpionidae, are scavengers of dead or dying animals stranded by waves or by the lowering of the lake level (Fig. 1).

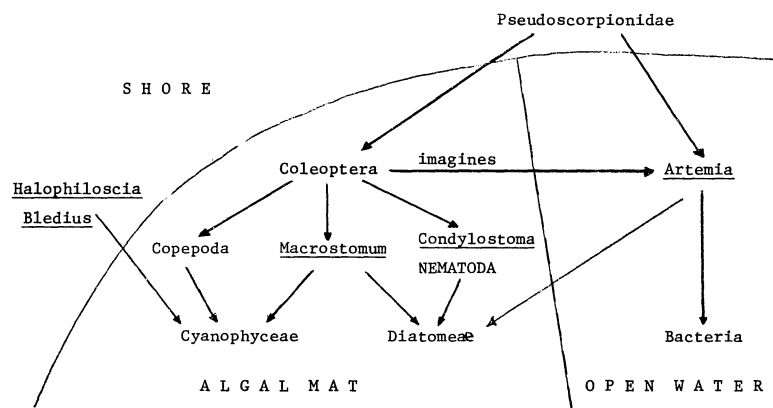


Fig. 1. Schematic food web in Solar Lake.

A few more facts have to be added. For most of the animals, the winter months of lower salinity are optimal. Maximum numbers of copepods, platyhelminths and ciliates are found. *Artemia* probably reproduces during the winter. *Bledius* also reproduces in winter, and possibly the pseudoscorpions too. During the winter, a number of animal species may appear, and then disappear towards the summer: the ostracode *Cyprideis littoralis*, the may-fly *Cloeon dipterum* and the brine fly *Ephydra*.

In the summer, salinity in the epilimnion increases; stratification disappears for several weeks and oxygen reaches the bottom of the lake. Only a limited number of species use the opportunity to spread through the whole water column. These salinity resistant species are the harpacticoid copepod *Robertsonia salsa*, the brine shrimp *Artemia salina* and the different species of water beetles. In the 9-10 months of stratification, benthic life is limited to a strip of 2-5 m around the lake margins, at a water depth of 60-80 cm — while in the summer more salt resistant species cover the whole bottom. *Artemia salina* is limited during most of the year to the epilimnion, by the 1-1.5 m deep pycnocline, but in the summer it swarms over the whole water mass.

The faunal community of Solar Lake is apparently a very stable community. The species have no resting forms, since the lake does not dry out. The species which do not thrive during the short high-salinity period can probably survive in the seepage streamlets flowing into the lake from the nearby sea.