

First Report of the Regular Limnological Survey of Lake Biwa (Oct. 1965-Dec. 1966)

III. Zooplankton^{*) **)}

By

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The counts of zooplankton were carried on the same specimens with the phytoplankton. The method of counting is as follows: an aliquot portion of any sample was set on the scaled slide glass and all the zooplankters found there were counted. The individual numbers per cubic meter are listed in the Table 1. The uppermost division of quantitative collection at Ie-1, vertical haul from five meter depth to the surface, was subdivided into two portions since July 1966 with an exception in September. That is to say, the new divisions are upper two and lower three meters respectively.

The males, females and copepodids of *Eodiaptomus* were counted separately, but in the tables were shown the sum of them. *Cyclops vicinus* and *Mesocyclops leuckarti* are listed in the same column, because they are hardly distinguishable in the early copepodid stages. *Keratella cochlearis* involves several varieties, e.g. *macracantha micracantha*, and *tecta*. A species of *Diffugia* seems to be identical with *Diffugia brevicolla* Cash which had been described by Kawamura (1918), however, it might be another species, probably a new one, as had later been pointed out by Negoro (1954).

TABLE 1 List of Zooplankton (1965-1966)

Class Crustacea
Subclass Copepoda
<i>Eodiaptomus japonicus</i> (Burckhardt)
<i>Mesocyclops leuckarti</i> (Claus)
<i>Cyclops vicinus</i> Uljanin
Subclass Cladocera
<i>Daphnia longispina</i> (O. F. Müller)

* In this article, the results of our several preliminary surveys (from July to Sept. 1965) were also described.

** Contributions from the Otsu Hydrobiological Station, Kyoto University, No. 190.

- Daphnia biwaensis* Uéno
Daphnia galeata G. O. Sars*
Diaphanosoma brachyurum (Liévin)
Bosmina longirostris (O. F. Müller)
Bosminopsis deitersi Richard
Alona quadrangula (O. F. Müller)*
Chydorus sphaericus (O. F. Müller)*
Leptodora kindtii (Focke)
- Subclass Malacostracha
- Order Amphipoda
- Anisogammarus amandalei* (Tattersall)
- Class Rotatoria
- Rotaria rotatoria* (Pallas)
Conochilus unicornis Rousselet
Filinia longiseta (Ehrenberg)
Filinia longiseta terminalis (Plate)
Hexarthra mira (Hudson)
Pompholyx complanata Gosse
Synchaeta oblonga Ehrenberg
Synchaeta stylata Wierzejski
Synchaeta tremula (O. F. Müller)
Polyarthra vulgaris Carlin
Polyarthra euryptera Wierzejski*
Ploesoma truncatum (Levander)
Ploesoma hudsoni (Imhof)*
Trichocerca capucina (Wierzejski)
Trichoceca chattoni (de Beauchamp)
Trichocerca birostris (Minkiewicz)
Trichocerca elongata (Gosse)*
Trichocerca pusilla (Jennings)*
Asplanchna priodonta Gosse
Brachionus quadridentatus Hermann
Brachionus angularis Gosse
Brachionus calyciflorus Pallas
Brachionus falcatus Zacharias*
Brachionus dimidiatus (Bryce)*
Brachionus urceolaris O. F. Müller*
Platylabus quadricornis (Ehrenberg)*
Keratella cochlearis (Gosse)
Keratella quadrata (O. F. Müller)
Keratella valga (Ehrenberg)
Notholca labis Gosse
Notholca acuminata (Ehrenberg)*
Euchlanis dilatata Ehrenberg*
- Class Rhizopoda
- Order Arcellinida
- Diffflugia biwae* Kawamura
Diffflugia corona Wallich
Diffflugia brevicolla Cash ?

Centropyxis aculeata (Ehrenberg)*
Arcella vulgaris Ehrenberg*
 Class Chromonadea
 Order Dinoflagellida
Ceratium hirundinella (O. F. Müller)
 Class Ciliata
 Order Tintinnida
Tintinnidium fluviatile (Stein)
Tintinnopsis cratera (Leidy)
 Order Peritrichida
Carcesium polypinum (Linnaeus)

* shows the species seldom seen.

Table 2 Zooplankton of southern basin (n/m³)

		1965						
Station		VII 8	VIII 2	IX 1	X 1	X 15	XI 2	
1	<i>Eodiaptomus japonicus</i>	Nb2	36250	560000	-	6300	5000	111600
		Nb5	-	6400	-	34500	11250	13000
		Na3	412500	1000	1000	17500	5000	-
2	<i>Mesocyclops leuckarti</i>	Nb2	3750	4000	-	-	-	3600
		Nb5	-	1500	-	-	3750	-
		Na3	-	1500	1000	3500	5000	-
3	<i>Nauplii</i>	Nb2	50000	60000	-	42000	25000	-
		Nb5	-	37000	-	126500	7500	19500
		Na3	93750	23500	10000	196000	15000	7000
4	<i>Daphnia longispina</i>	Nb2	-	-	-	-	-	-
		Nb5	-	-	-	-	-	-
		Na3	47500	-	-	-	-	-
5	<i>Diaphanosoma brachyurum</i>	Nb2	8750	20000	-	-	-	7200
		Nb5	-	-	-	-	-	-
		Na3	-	-	-	-	-	-
6	<i>Bosmina longirostris</i>	Nb2	-	-	-	-	-	-
		Nb5	-	-	-	-	-	-
		Na3	-	-	-	-	-	-
7	<i>Bosminopsis deitersi</i>	Nb2	-	-	-	-	-	-
		Nb5	-	-	-	-	-	-
		Na3	-	500	-	-	-	-
8	<i>Leptodora kindtii</i>	Nb2	-	-	-	-	-	-
		Nb5	-	-	-	-	-	-
		Na3	3750	-	-	-	-	-
9	<i>Keratella cochlearis</i>	Nb2	1200	-	-	6300	30000	7200
		Nb5	-	-	-	5700	18750	6500
		Na3	-	-	2500	3500	40000	3000
10	<i>Keratella quadrata</i>	Nb2	-	-	-	-	-	-
		Nb5	-	-	-	-	-	-
		Na3	-	-	-	-	-	-

	Station	1965					
		VII 8	VIII 2	IX 1	X 1	X 15	XI 2
11 <i>Keratella</i> <i>valga</i>	Nb2	-	-	-	-	-	-
	Nb5	-	-	-	-	-	-
	Na3	-	-	500	-	-	-
12 <i>Brachionus</i> <i>angularis</i>	Nb2	2500	-	-	12600	-	-
	Nb5	-	750	-	-	-	-
	Na3	-	-	-	-	-	-
13 <i>Brachionus</i> <i>calyciflorus</i>	Nb2	-	-	-	-	-	-
	Nb5	-	-	-	-	-	-
	Na3	-	-	-	-	-	-
14 <i>Brachionus</i> <i>quadridentatus</i>	Nb2	-	-	-	-	5000	-
	Nb5	-	-	-	-	-	-
	Na3	-	-	-	-	-	-
15 <i>Polyarthra</i> <i>vulgaris</i>	Nb2	2500	-	-	16800	-	-
	Nb5	-	-	-	-	7500	6500
	Na3	-	-	500	-	40000	-
16 <i>Conochilus</i> <i>unicornis</i>	Nb2	100	-	-	-	-	-
	Nb5	-	-	11500	-	-	-
	Na3	1250	-	500	-	-	-
17 <i>Pompholyx</i> <i>complanata</i>	Nb2	2500	-	-	-	15000	3600
	Nb5	-	-	-	-	15000	6500
	Na3	-	-	-	-	40000	-
18 <i>Filinia</i> <i>longiseta</i>	Nb2	-	-	-	-	-	-
	Nb5	-	750	-	5700	-	-
	Na3	-	500	-	-	5000	-
19 <i>Hexarthra</i> <i>mira</i>	Nb2	-	-	-	-	-	-
	Nb5	-	-	-	-	-	-
	Na3	-	-	-	-	-	-
20 <i>Trichocerca</i> <i>chattoni</i>	Nb2	-	-	-	-	-	-
	Nb5	-	-	-	-	-	-
	Na3	-	500	-	-	-	-
21 <i>Trichocerca</i> <i>capucina</i>	Nb2	-	-	-	2100	-	-
	Nb5	-	-	-	-	-	-
	Na3	-	-	-	-	-	-
22 <i>Trichocerca</i> <i>birostris</i>	Nb2	100	-	-	-	10000	7200
	Nb5	-	-	-	-	-	-
	Na3	-	-	-	-	5000	-
23 <i>Synchaeta</i> <i>oblonga</i>	Nb2	-	-	-	-	-	-
	Nb5	-	-	-	-	-	-
	Na3	-	-	-	-	-	-
24 <i>Synchaeta</i> <i>stylata</i>	Nb2	6250	-	-	-	-	-
	Nb5	-	7100	-	-	-	-
	Na3	3750	4500	500	-	-	-

		1965					
Station		VII 8	VIII 2	IX 1	X 1	X 15	XI 2
25 <i>Ploesoma</i> <i>truncatum</i>	Nb2	-	-	-	-	5000	-
	Nb5	-	375	-	-	-	-
	Na3	-	5000	-	-	-	-
26 <i>Asplanchna</i> <i>prionota</i>	Nb2	-	-	-	-	-	-
	Nb5	-	-	-	-	-	-
	Na3	-	-	-	-	-	-
27 <i>Rotaria</i> <i>rotatoria</i>	Nb2	5000	-	-	-	-	-
	Nb5	-	-	-	-	-	-
	Na3	-	-	-	-	-	-
28 <i>Diffugia</i> <i>birwae</i>	Nb2	-	-	-	-	-	-
	Nb5	-	-	-	-	-	-
	Na3	-	-	12000	-	-	-
29 <i>Diffugi</i> <i>corona</i>	Nb2	-	-	-	-	-	-
	Nb5	-	-	-	-	-	-
	Na3	-	-	3500	-	-	-
30 <i>Ceratium</i> <i>hirundinella</i>	Nb2	-	4000	-	4200	15000	3600
	Nb5	-	2250	-	92000	40000	6500
	Na3	-	-	-	35000	15000	3000
31 <i>Carchesium</i> <i>polypinum</i>	Nb2	-	-	-	-	-	-
	Nb5	-	-	-	-	-	-
	Na3	-	-	-	-	-	-

		1966								
		XI 15	XII 2	XII 13	I 5	II 17	III 18	III 31	IV 12	IV 30
1	-	-	-	-	-	-	-	-	-	2000
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	500	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
3	-	-	-	2500	-	6500	6000	7500	-	-
	5000	-	5000	2000	3000	4200	-	-	-	-
	-	5000	5000	1500	500	500	-	-	-	-
4	-	5000	-	-	-	-	-	-	-	-
	-	5000	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	2000
	-	-	-	500	-	-	-	-	-	6000
	-	-	5000	500	500	-	-	-	-	6000

		1966							
	XI 15	XII 2	XII 13	I 5	II 17	III 18	III 31	IV 12	IV 30
21	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
22	-	-	-	-	-	500	-	2500	2000
	-	-	-	-	-	-	-	-	2000
	20000	-	-	-	500	-	2000	-	-
23	-	-	4000	2500	2750	10000	8000	3000	-
	-	-	5000	2500	750	27600	-	-	-
	-	-	-	4000	-	29500	-	-	-
24	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
	55000	-	-	-	-	-	-	-	-
25	-	-	-	-	-	-	-	-	-
	7000	-	-	-	-	-	-	-	-
	60000	5000	5000	-	-	-	-	-	-
26	-	-	-	-	-	500	-	500	-
	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
27	-	-	-	-	250	-	-	-	-
	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
28	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
29	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
30	3750	-	-	1000	-	500	-	-	6000
	-	-	-	4000	750	600	-	-	2000
	5000	10000	-	2000	50	-	-	-	-
31	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-

		V 16	V 30	VI 13	VII 16	VIII 18	IX 16	X 15	XI 19	XII 19
1	14000	19500	189000	24000	4000	6000	24000	2000	500	500
	2000	1000	-	7000	24000	2000	2000	0	0	1000
	-	-	-	4000	2000	-	9500	1000	-	-
2	2000	750	4000	5000	7000	-	-	500	-	-
	2000	3000	-	1000	3000	1000	-	-	-	-
	-	1000	-	2000	2000	-	-	-	-	-
3	34000	16500	26000	55000	35000	82000	15500	1000	2500	2500
	24000	10000	-	79000	26000	103000	1000	750	8000	8000
	18000	14000	-	118000	47000	5300	40500	14000	-	-

	V 16	V 30	VI 13	VII 16	VIII 18	IX 16	X 15	XI 19	XII 19
4	-	-	-	-	-	-	-	-	1500
	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
5	-	-	-	3000	2000	1000	1000	-	-
	-	-	-	-	3000	6000	1000	-	-
	-	-	-	2000	14000	1800	1500	-	-
6	212000	-	-	-	-	-	2500	-	-
	102000	-	-	-	-	-	-	-	-
	52000	1000	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
	-	-	-	1000	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
9	10000	8250	6000	1000	-	4000	2000	1000	1000
	6000	2000	-	-	-	12000	1500	2250	-
	5000	3000	-	-	-	3000	14000	4000	3500
10	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	10000	-	-	-
	-	-	-	-	-	4000	-	-	-
12	-	6000	27000	4000	1000	28000	-	-	-
	2000	2000	-	-	-	10000	-	-	-
	-	1000	-	10000	4000	7000	-	-	-
13	-	-	-	-	2000	-	-	-	500
	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
14	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
15	10000	4500	1000	4000	1000	4000	-	2000	-
	16000	3000	-	-	-	5000	-	4500	-
	26000	17000	-	27000	-	4000	500	1000	1500
16	1258000	3000	-	1000	5000	15000	3000	-	-
	360000	4000	-	-	202000	35000	-	-	-
	503000	2000	-	1000	116000	26000	-	-	-
17	-	-	8000	17000	-	-	6500	1500	-
	-	-	-	-	4000	1000	3000	12500	12000
	-	-	-	2000	-	-	-	2500	-

	V 16	V 30	VI 13	VII 16	VIII 18	IX 16	X 15	XI 19	XII 19
18	-	-	8000	4000	2000	29000	-	-	-
	-	-	-	-	2000	9000	-	-	-
	-	-	-	4000	8000	60000	-	-	-
19	-	-	-	-	-	1000	-	-	-
	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	3000	-	-	-
20	-	-	-	-	-	-	-	-	-
	-	-	-	-	2000	-	-	-	-
	-	-	-	-	-	-	-	-	-
21	-	750	1000	1000	4000	5000	1500	500	-
	-	-	-	-	3000	1000	-	-	-
	-	-	-	-	-	1000	500	1000	-
22	2000	2250	10000	3000	-	13000	500	-	-
	2000	2000	-	-	2000	3000	500	250	-
	-	-	-	1000	-	4000	-	500	-
23	-	35000	10000	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	4000
	-	14000	-	-	-	-	-	-	12000
24	88000	1500	17000	8000	-	-	-	-	1000
	4000	-	-	6000	-	-	-	11250	-
	34000	-	-	137000	-	-	-	-	500
25	28000	-	3000	2000	-	-	1000	-	-
	4000	1000	-	-	-	1000	-	10500	-
	5000	14000	-	3000	-	4000	2000	-	-
26	28000	-	-	2000	-	-	-	-	-
	8000	-	-	-	-	-	-	-	-
	180000	1000	-	4000	-	-	-	-	-
27	-	-	-	-	-	-	2000	-	-
	-	-	-	-	-	-	-	-	-
	-	1000	-	-	-	-	-	-	-
28	-	-	-	-	-	-	-	-	-
	-	-	-	-	3000	-	-	-	-
	-	-	-	-	1000	-	-	-	-
29	-	-	-	2000	-	9000	3000	1000	-
	-	-	-	-	2000	10000	-	-	-
	-	-	-	-	-	29000	-	-	-
30	-	6000	70000	23000	25000	17000	3500	1500	-
	8000	41000	-	7000	17000	10000	1000	250	-
	3000	5000	-	15000	-	5000	500	500	-
31	27000	68000	-	-	-	4000	-	2500	-
	12000	-	-	-	-	-	-	2000	-
	4000	-	-	1000	-	1000	-	1000	-

Table 3 Zooplankton of northern basin (Ie-I) (n/m³)

date depth	1965												1966											
	VII- 15	VIII- 16	IX- 15	X- 18	XI- 16	XII- 15	I- 13	II- 16	III- 16	IV- 18	V- 13	VI- 15	VII- 15	VIII- 19	IX- 13	X- 14	XI- 19	XII- 19						
<i>Eodiaptomus</i>	0-5(m)	5760	50400	19200	13600	1120	4000	-	-	-	1680	11100	2700	2600	6600	1520	9900	1700	3600					
<i>jeponicus</i>	5-10	1200	23800	5880	3200	560	2800	40	-	-	720	-	5200	10520	840	10440	4680	2760	840					
	10-20	960	10200	1200	200	560	400	120	40	-	80	560	250	1200	440	760	3160	200	3220					
	20-30	120	2400	560	-	1200	800	400	60	-	200	120	60	100	60	120	320	100	2480					
	30-50	470	300	180	60	-	300	140	345	60	40	20	20	80	10	-	25	30	1380					
	50-70	70	100	-	100	-	+	40	30	10	10	45	-	20	-	30	-	14	50					
<i>Mesocyclops</i>	0-5	-	4800	2400	1200	560	800	-	-	-	960	200	285	1600	1800	160	100	-	100					
<i>leuckarti</i>	5-10	240	5600	2760	800	-	800	-	80	-	560	-	200	400	600	320	80	120	80					
&	10-20	-	1800	680	200	280	400	40	40	-	60	240	150	800	400	80	560	420	120					
<i>Cyclops</i>	20-30	120	1400	200	200	600	200	80	-	120	100	120	60	180	100	-	280	160	80					
<i>vicinus</i>	30-50	170	300	920	80	360	50	-	-	-	30	80	50	520	160	350	240	80	260					
	50-70	10	-	-	100	280	-	60	-	-	60	170	680	-	340	-	20	20	20					
<i>Nauplii</i>	0-5	1360	16200	98400	5200	280	800	-	960	9240	11280	5200	11400	33000	15200	11100	1300	-	-					
	5-10	720	19600	18100	800	-	200	80	320	5520	4000	-	5000	15240	4720	2520	360	300	300					
	10-20	360	5600	1840	400	140	-	40	520	3040	1100	240	1100	5040	2560	1760	360	280	400					
	20-30	120	9400	560	-	120	-	160	240	1760	760	120	480	1840	8360	2000	440	60	640					
	30-50	180	1300	240	20	-	-	20	180	210	100	30	120	240	200	-	120	-	680					
	50-70	50	1500	-	100	-	-	120	190	50	80	75	70	160	-	80	5	10	440					
<i>Daphnia</i>	0-5	2000	-	-	10000	-	-	-	-	-	-	100	30	800	400	-	-	-	200					
<i>longispina</i>	5-10	480	4200	-	2400	-	-	-	-	-	-	-	-	2520	240	-	-	-	60					
	10-20	240	800	-	200	-	-	-	-	-	-	-	-	80	120	-	40	-	80					
	20-30	-	-	-	-	-	-	-	-	-	-	-	-	120	80	-	80	-	40					
	30-50	120	-	-	-	-	-	-	-	-	-	-	-	20	-	-	-	-	-					
	50-70	-	-	-	-	-	-	-	-	-	-	-	-	20	10	5	-	-	-					

		1966																		
		1965						1966												
		VII- 15	VIII- 16	IX- 15	X- 18	XI- 16	XII- 15	I- 13	II- 16	III- 16	IV- 18	V- 13	VI- 15	VII- 15	VIII- 19	IX- 13	X- 14	XI- 19	XII- 19	
<i>Synchaeta</i>	0-5	-	-	-	-	-	-	-	-	28200	1620	800	-	-	-	-	-	-	-	300
<i>oblonga</i>	5-10	-	-	-	-	-	-	-	-	5160	800	-	-	-	-	-	-	-	-	-
	10-20	-	-	-	-	-	-	-	-	1600	320	240	50	-	-	-	-	-	-	120
	20-30	-	-	-	-	-	-	-	-	1440	160	40	-	-	-	-	-	-	-	-
	30-50	-	-	-	-	-	-	-	-	270	80	60	-	-	-	-	-	-	-	40
	50-70	-	-	-	-	-	-	-	-	340	90	75	-	-	-	-	-	-	-	5
<i>Ploesoma</i>	0-5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>truncatum</i>	5-10	-	-	-	-	-	-	-	-	-	80	-	-	-	-	-	-	-	-	-
	10-20	120	200	280	-	-	-	-	-	-	-	-	150	40	-	-	-	-	-	-
	20-30	-	-	1080	-	-	-	-	-	-	-	-	240	100	-	-	-	-	-	-
	30-50	-	-	240	20	-	-	-	-	-	-	-	20	40	-	-	-	-	-	-
	50-70	10	-	-	-	-	-	-	-	-	-	-	20	-	-	-	-	-	-	-
<i>Asplanchna</i>	0-5	-	-	-	-	-	-	-	-	120	60	-	-	-	-	-	-	-	-	100
<i>priodonta</i>	5-10	-	-	-	-	-	-	-	-	-	160	-	-	-	-	-	-	-	-	60
	10-20	-	-	240	-	-	-	-	-	-	-	-	-	320	280	160	-	-	-	-
	20-30	-	-	40	-	-	-	-	-	-	-	-	-	20	140	120	160	20	40	-
	30-50	-	-	20	-	-	-	-	-	-	-	-	-	-	10	60	-	-	-	-
	50-70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-	-	-	-
<i>Ceratium</i>	0-5	-	2400	52800	11600	-	10400	1600	2160	-	3240	18100	12150	6600	2800	108400	7200	5600	1200	-
<i>hirundinella</i>	5-10	-	2800	41760	800	840	2000	360	320	720	320	-	2600	1080	5040	108400	1920	900	60	-
	10-20	-	1200	9640	200	420	800	160	40	120	100	120	550	3440	840	20560	600	200	-	-
	20-30	20	600	7040	200	-	200	240	180	40	160	160	180	760	440	7520	960	360	-	-
	30-50	10	300	1200	20	420	-	40	210	15	40	40	160	400	340	6960	880	60	-	-
	50-70	10	200	10	-	-	100	-	50	20	30	30	40	180	100	3840	45	190	40	-

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