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E-mail: marina.afanasieva@mtu-net.ru

**

620151, , 7
E-mail: amon@igg.uran.ru

Departamento Ecologia, Genetica y Evolucion, Facultad de Ciencias Exactas y Naturales.
Universidad de Buenos Aires. C1428EHA Buenos Aires, Argentina
E- mail: demetrio@bg.fcen.uba.ar

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**RADIOLARIAN ECOLOGY AND BIOGEOGRAPHY: NEW VISION OF THE PROBLEM.
PART 1. ECOLOGY AND TAPHONOMY**

M.S. Afanasieva*, E.O. Amon, D. Boltovskoy*****

*Paleontological Institute RAS

**Institute of Geology and Geochemistry, Urals Branch of RAS

***University of Buenos Aires

Analysis of published data on the distribution of Recent radiolarians in various climatic and oceanographic zones indicates that their tapho- and orictocoenoses are chiefly originated by biocoenoses which inhabited the upper water layers (0-500 m). Several aspects of radiolarian biology, ecology and taphonomy are discussed and the conclusion is reached that members of this group cannot be regarded as unequivocal indicators of oceanic deep-water conditions.

Key words: *Radiolaria, ecology, settling, taphonomy, recent.*

» [, 1973; , 1959; , 1981, 1986; , 1988; , 1995; Kling, 1978; Anderson et al., 2002, .].
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(32-38 ‰)

» [, 1959, . 412].

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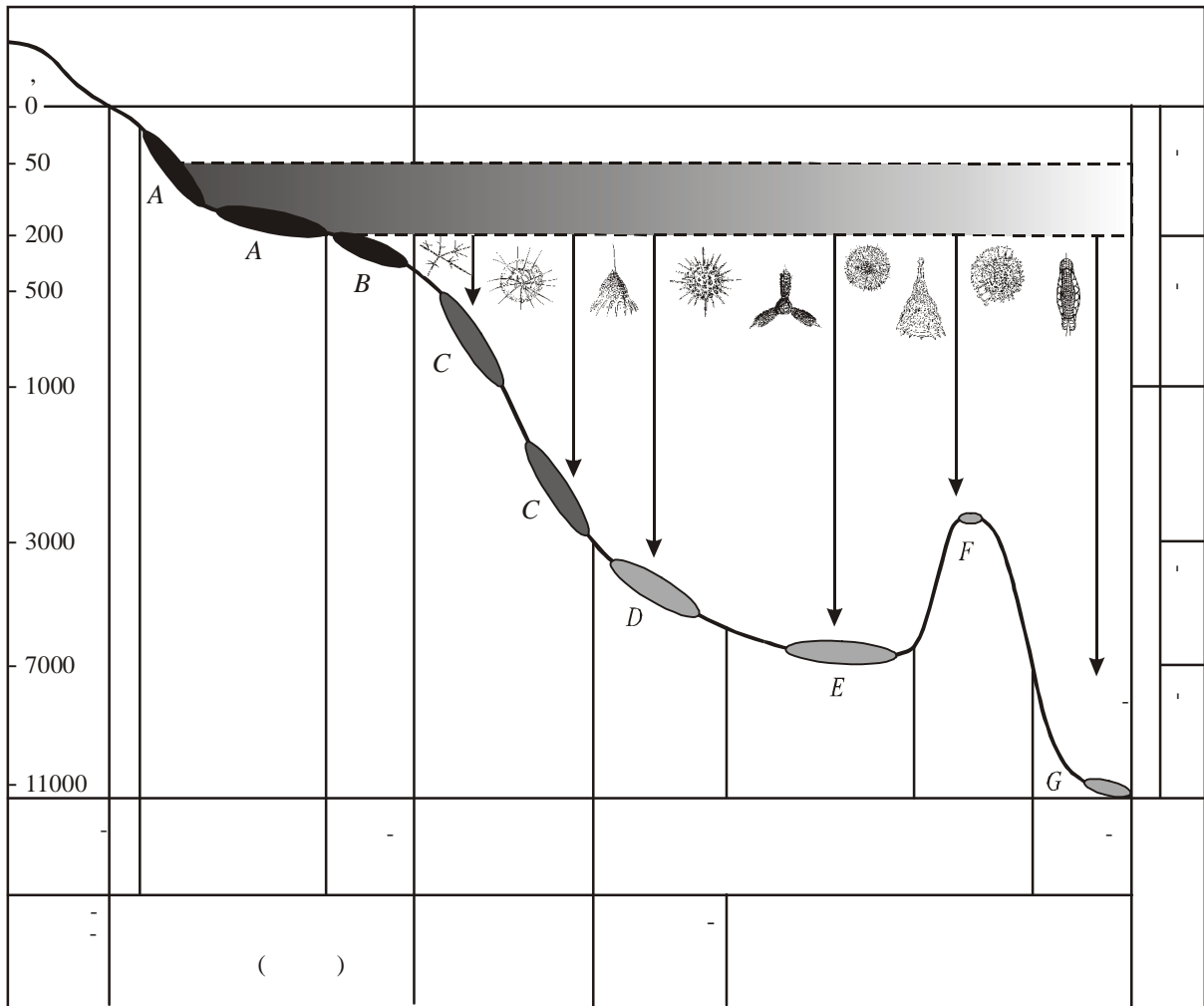
.)» [, 2002, . 19].

[Boltovskoy et al., 2003].

[Bol-
 tovs koy, 1998, 1999; Boltovskoy et al., 1993,
 1996; Bjorklund, Kruglikova, 2003; , 2000,
 2004; , 2003;
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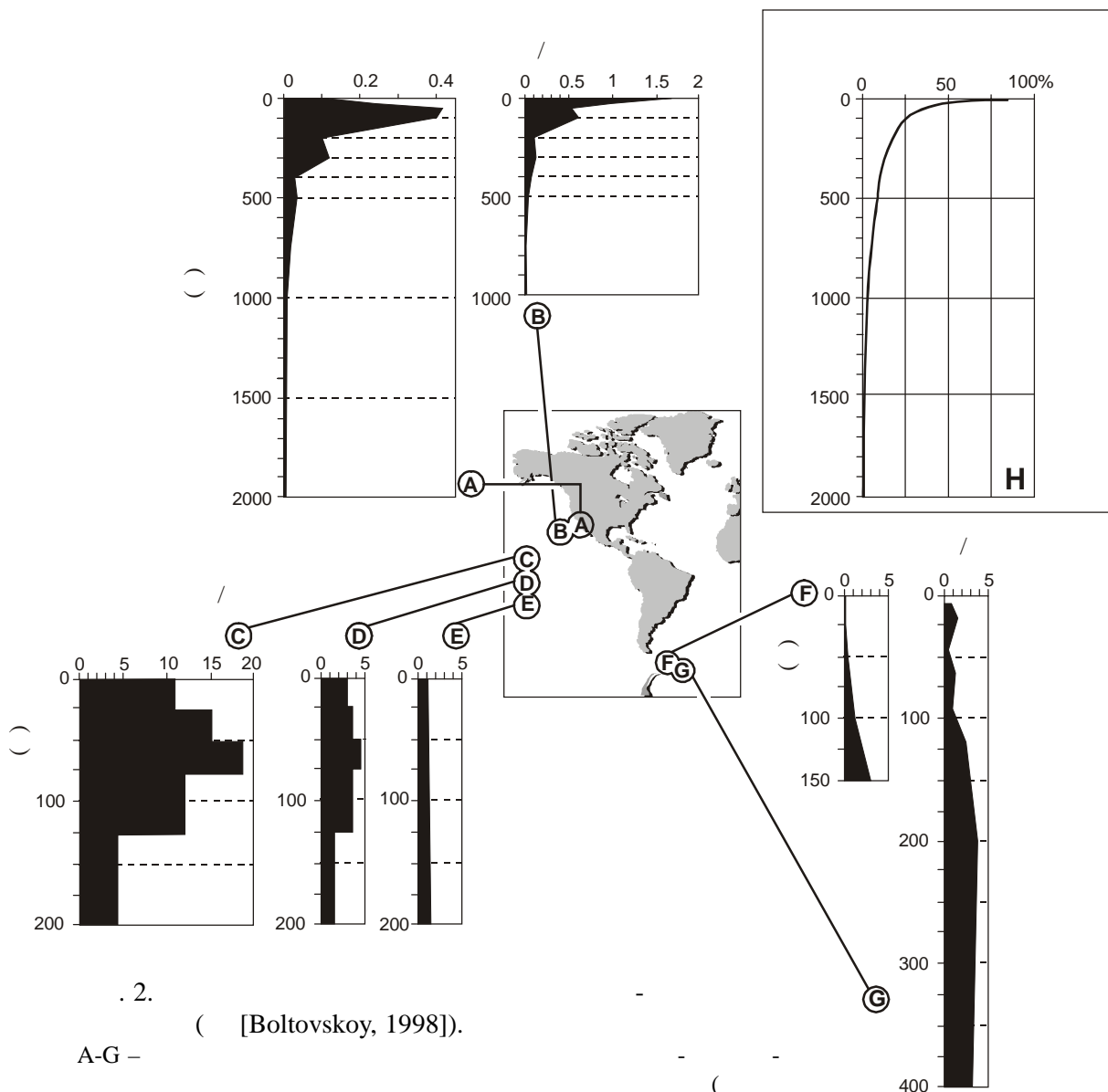
[,
 1966, 1981, 1986; , 1966, 1990;
 , 1973; McMillen, 1979;
 Palmer, 1986; Kruglikova, 1989a; Nishimura et al.,
 1997, .].

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 , kahashi, 1981; Bernstein et al., 1999].
 - , -
 - 50-200 .
 (. 2A,B),
 -
 (. 1)
 [, 1986; , 1990; Kruglikova, 1989 ; Boltovskoy, 1998; , 2004].
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 (0-75) , , .
 200-400 [Boltovskoy, 1998].
 100-200
Acantharia *Phaeodaria* -
 [Ta-



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 A-G -

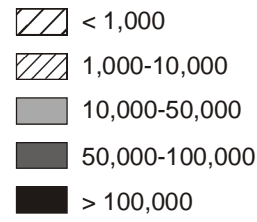
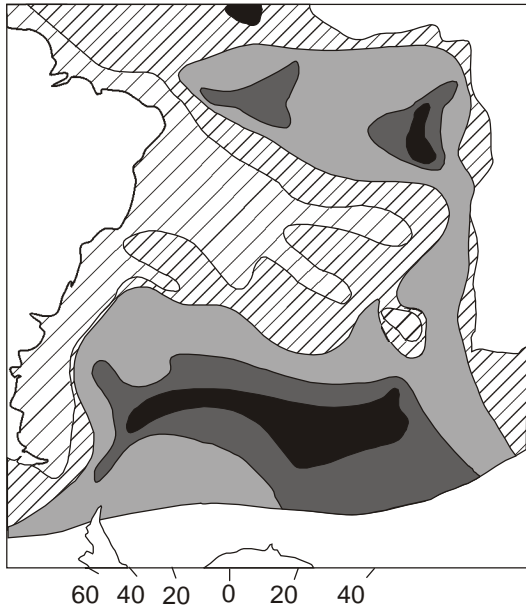
[Anderson et al., 1989b]



2. ([Boltovskoy, 1998]).
A-G –

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(%).



1 ([Boltovskoy, 1999]).

ter tetras tetras, *Spongas-*

(), (-)

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: 37,8 ./³.

[Boltovskoy et al., 1993].

[Caron, Swanberg, 1990].

Pseudocubus obeliscus Hkl. 2-3) *Plagoniidae*, *nadinae*

7- « »

9 « » [Matsuoka, 2003].

Peridinea, *Cryptomo-*

Scrippsiella nutricula [Gast, Caron, 2001].

1979; [Swanberg, 1986]. « » ,
 « » -
 (80 %).
 50-75 ,
 (2,6 / ³)
 150 [Michaels et al., 1990].
 [, 2004].
 « »
 » [, 2004].
 75-100 .
 [Gast, Caron, 2001].
 [, 1995]. 50-
 200
 100-200 , *Didymocyrtis tetrathalamus tetrathalamus*,
 [, 1966; , 2004].
 [Caron et al., 1995]. [Anderson et
 al., 1990 ,].
 [1990 ,],
Acantharia, Radiolaria, Foraminifera.
Acantharia
Radiola-
ria
 70 (8-67 %).

truncatum

Dictyocoryne

[Anderson, Matsuoka, 1992].

[Ta-

kahashi, 1991],

SiO₂.

70-140

[, 1986].

[Lazarus, 2002].

[, 1990].

(. .

)

[, 1990; , 1986; , 1988; ., 1999]:

80

25 [Kling,

Boltovskoy, 1995].

[1994 ,]

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[, ., 1999].

1994]

[Takahashi, 1991,

[Boltovskoy et al., 1993].

1986; , 1990].

1997].

[Nishimura et al.,

60-

15°

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10°C

[Anderson et al., 1989 , ,].

70

30-32-38-40 ‰
30-32 ‰,

(),

[Swanberg, Bjorklund, 1992; Bjorklund, Ciesielski, 1994; Kruglikova, Bjorklund, 1995; Cortese, Bjorklund, 1995].

17-12

[, 1994].

Spumellaria
Nassellaria.

(*Nassellaria* 70-95 %
Plagiacanthidae *Eucyrtididae* .

Spyrida),
Actinommidae

[, 1990;
, 1994 ,].

[Cortese, Bjork-

lund, 1995],

[Kruglikova, Bjorklund, 1995].

tovskoy et al., 2003]

(.4).

tovskoy et al., 2003],

rioplatensis.

Lophophaena

: 248 ./

394 ./

(

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, 2003].

1-2 ./ [Boltovskoy, 1998],

0,075-0,17 ./ [Boltovskoy,

1998], 75 ./³ () 170 ./³

() [, 2000].

35-38° . .

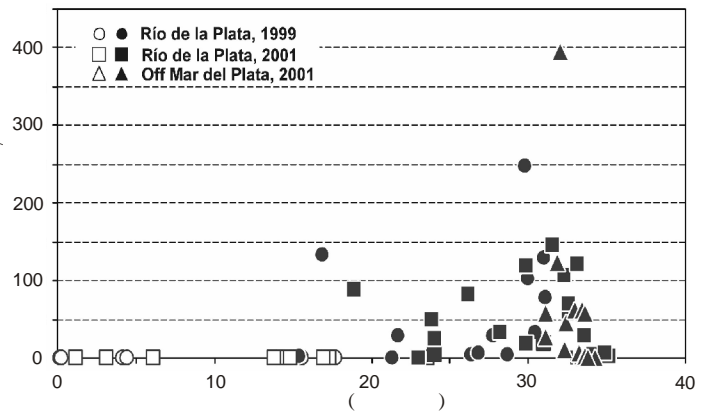
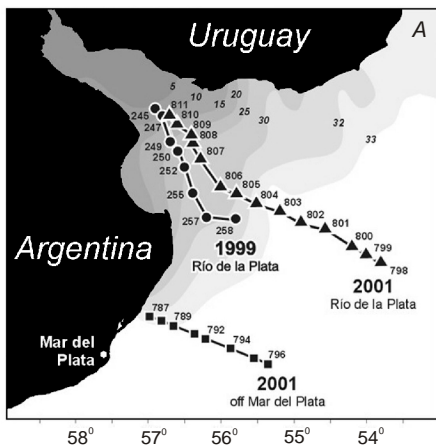
320

230 ,

5-15 ,

150-180 .

100



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A -

1999 2001 .;

(1

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([Boltovskoy et al., 2003]).

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 (,), , 75 %
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 - 900-2000
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 , [, 1990].
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 - 0,3-1 ./ , 75 %
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 (50 ./)
 - , ,
 - [Caron, Swanberg, 1990]. 70 % [, 1987].
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 (. 3),
 - 2·10⁻² / .
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 -
 [Boltovskoy, 1998, 1999].
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 (. 3). (. 3).
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 [Abelmann, Gowing, 1997],
 [Boltovskoy
 et al., 1996].
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 30° . ., 10° . . (.), .
 -
 -
 100-300
 0-150
 [Abelmann, Go-
 wing, 1997] (0,3 ./ , , 5000 ,
 0-100, 0-150
 [Boltovskoy, Alder, 1992]). - 10-300
 (30-60° . ., 55° . .)
 (5-15)
 -
 0,5 ./ ,
 3 ./ [Alder et al., 1997].
 -
 -
Cycladophora

davisiana davisiana

[Bj rklund, Ciesielski, 1994].

200-500

0-25

50-100

[Kling, 1979; Kling, Boltovskoy, 1995; Abelman, Gowing, 1997; Boltovskoy, 1998, 1999] (. 2).

[Kling, Boltovskoy, 1995].

50 100

[, 1966; Kling, Boltovskoy, 1995; Boltovskoy, 1998, 1999].

[Boltovskoy, 1998,

1999]. *Siphocampe arachnea*,

200-400 [

, 1966 Abelman, Gowing, 1997; Boltovskoy, 1998, 1999].

100-300 ,

300-1000 [Boltovskoy, 1994].

2000

: (1)

0 , 25 , 50

0 50 , 0 100 ; (2)

100 ; (3)

200 , 3)

300

200 300 ; (4) , 2003; , [, 2003; , 2004].

[Kling, Boltovskoy, 1995].

(0-100-200)

(, [Renz, 1976; Dworetzky, Morley, 1987; Kling, 1979]).

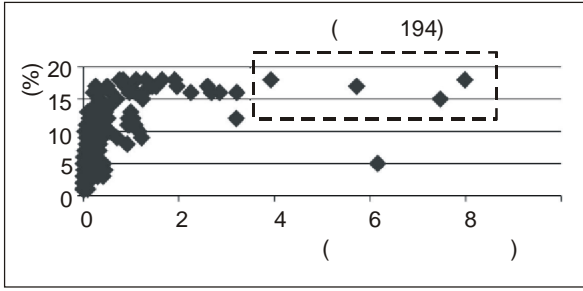
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Euradiolaria, -
- .

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10 %₀ - « » (,
1 %₀ -), « -
» (-
) [, 1981; , 1990].
[1981, . 34-35] -
, : 1) -
; 2) -
[Anderson et al., 1989a-]. ; 3) -
(-
); 4) -
5) -
. : 1) -
(-
, 2) -
(, -),
3) (-
),
(25,7°) -
(40 ‰).), 4) -
21° , -
30 ‰, [, 1986].
33-36° (-) ,
, -
() -
() -
[, 1986; , 1990; De
Wever et al., 1994, 2001].
, [, 1981, 1986].
[, 1990, . 93].

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 . 96]. «
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 [, 1990, . 95]. , -
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 [, 1990, . 95]. , ...
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 *Siphocampe arachnea*, ...
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 - :
 - (),
 [Boltovskoy, 1998]. ,
 , » [, 1990, . 96].
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 , - [Boltovskoy, 1998].
 [, 1990, . 95-96].
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([Boltovskoy, 1987]).

300 ,
 0-150 .

[Boltovskoy, 1998, 1999] (. 3).

[, 1986; Boltovskoy, 1998, 1999].

[, 2000].

[Boltovskoy, 1998, 1999].

[Boltovskoy, 1987].

(. 5).

[, 1986; Boltovskoy, 1987, 1998, 1999].

[Johnson, Nigrini, 1982; , 1986].

[, 2004]

()
 (Waipapa Terrane) [Aita, Bragin, 1999].

[, 1987; , 1991; , 2001].

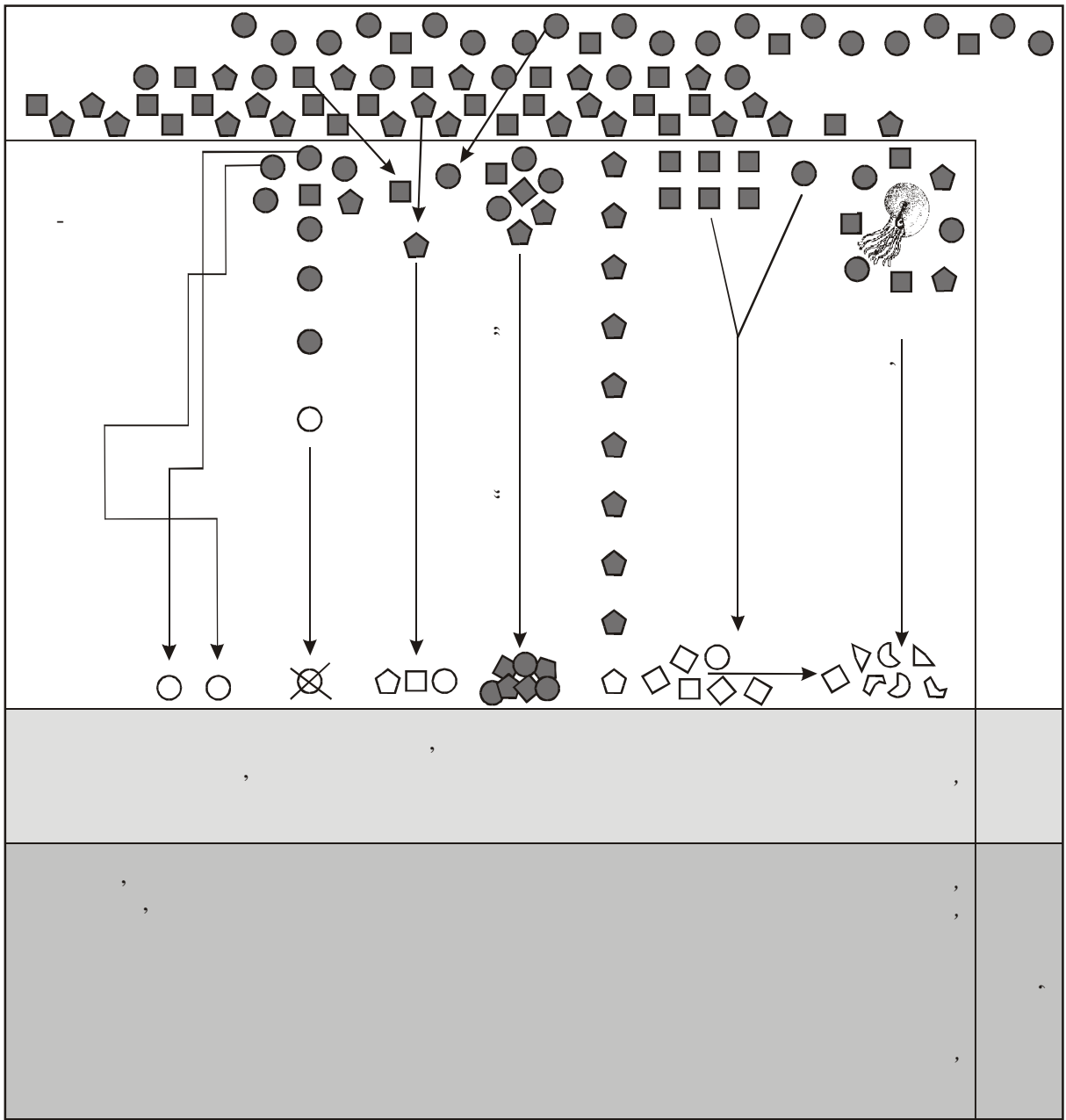
Prunobrachium
 [, 2000 , 2003].

[Hollis, 2002],

[1999].

[Lazarus, 2002].

. . . , . . . , . . .
 , - -
 , 50-200 [Kling, Boltovskoy, 1995; Boltovskoy, 1998, 1999; Abelman, Gowing, 1997] (. 2A-G).
 - -
 : 1) -
 0-50 , ; 2) -
 (. 1). - 50
 50-200 ; 3) -
 , - [, 1986;
 , 2004; Boltovskoy, 1998, 1999].
 - -
 - 4000,
Radiolaria. 5000, 8000 [., 1959],
 - -
 (. 6) [Boltovskoy, 1987, 1994, 1997, 1998]:
 - (,) , -
 - , -
 - , [Boltovskoy et al., 1993; Kling, Boltovskoy, 1995; Boltovskoy, 1998],
 - 500 : 100 %
 - , 50-60 % 100 , 20-40 %
 - 200 , 10-20 % 500 ,
 - 5 % 1000 , 2000
 - (. 2H).
 « ».
 - [-
 , 1966], . . . [, 2000]
 [Abelman, Gowing, 1997] -
 5000 . 90 % 100-200
 70 % 300-500 .
Acantharia ,
Phaeodaria - 50-
 , 100 -
 . -



6. ([Boltovskoy, 1997, 1998]).

[Boltovskoy et al., 1993; Boltovskoy, 1998]. () - , 1986]. ? - ? - 10-30 % Polycystina [« » ?

	()	()		
		50	100	200
$\rho - \rho_0 = 0,01 / ^3$				
20°	50	11,57 .	2,89 .	17,27 .
	100	23,15 .	5,79 .	1,44 .
	200	1,52 .	11,57 .	2,88 .
5°	500	4,88 .	1,22 .	9,24 .
	1000	9,76 .	2,44 .	18,49 .
	3000	2,44 .	7,32 .	1,82 .
	6000	4,88 .	1,22 .	3,65 .
$\rho - \rho_0 = 0,1 / ^3$				
20°	50	1,16 .	6,94 .	1,73 .
	100	2,32 .	13,89 .	3,45 .
	200	4,63 .	1,16 .	6,91 .
5°	500	14,84 .	3,71 .	22,19 .
	1000	29,68 .	7,42 .	1,85 .
	3000	2,93 .	22,26 .	5,55 .
	6000	5,86 .	1,46 .	11,09 .
$\rho - \rho_0 = 0,5 / ^3$				
20°	50	5,56 .	1,39 .	20,73 .
	100	11,11 .	2,78 .	41,46 .
	200	22,22 .	5,56 .	1,38 .
5°	500	2,97 .	17,81 .	4,45 .
	1000	5,94 .	1,48 .	8,90 .
	3000	17,81 .	4,45 .	1,11 .
	6000	1,17 .	8,90 .	2,23 .

(η)
 (35^{0/00})
 - 20° $\rho_0 = 1,0232 / ^3, \eta = 1,084$;
 - 5° $\rho_0 = 1,0273 / ^3, \eta = 1,595$.
 (r)
 [, 1999]:
 [, 1999].
 (ρ).
 ($\rho = 1,9-2,5 / ^3$,
 2,2 / ^3)
 $u = \Phi g r ^2 \frac{(\rho - \rho_0)}{\eta}$
 g - ;
 : = 0,222 φ . (φ)
 (S)
 (S), : $\varphi = S / S$.
 [, 2000].
 (. 1)
 (ρ) :

$\rho - \rho_0 = 0,01 / \text{ }^3$

100-200 ()

200 . 3 ()

, 1998; [, 2000]

100-200 . [Boltovskoy, 1987-1999; Boltovskoy et al., 1992-2003]. [Swanberg, Bjorklund, 1992]

(. 2).

14-416 / . [Takahashi, Honjo, 1983] 1000 / . [, 1984].

, 1990], [, 1966, 1998], [Welling, Pias, 1981, 1984; , 1966, 1981, 1986]. [Samtleben et al., 1995]

2

	()	()		
		50	100	200
$\rho - \rho_0 = 1 / \text{ }^3$				
20°	50	2,78 .	41,67 .	10,36 .
	100	5,56 .	1,39 .	20,73 .
	200	11,11 .	2,78 .	41,46 .
5°	500	1,48 .	8,90 .	2,22 .
	1000	2,97 .	17,81 .	4,44 .
	3000	8,90 .	2,23 .	13,31 .
	6000	17,81 .	4,45 .	1,11 .

... , ... , ...

[De Wever et al., 1994, 2001], 30-50 %

()

(. 1), 15-55 % [, 2004].

30 %

[1981, 1986],

3 % [Berger, 1976],

1-10 % [1987].

1966 [Bol-
tovskoy et al., 1996],
(10° . .-17° . .)

[, 1966, 1986]:

1. « 0-300 ,

10-30 % 853 , 2195

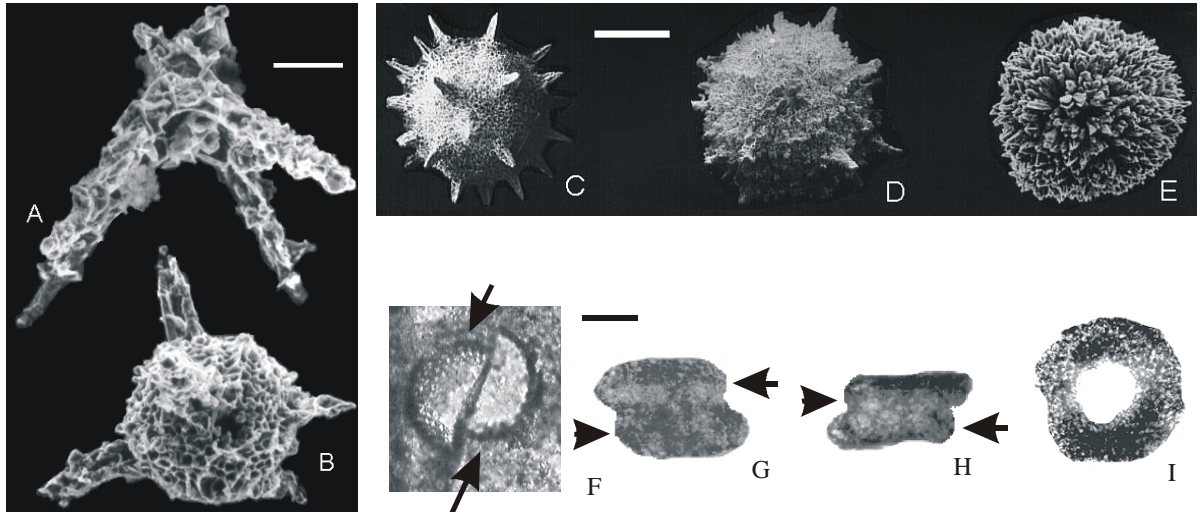
Polycystina» [, 1986, . 69].

2. «

» [, 1986, . 73].

3

	+20°	
-	+40°	+30°
	+120°	+50°
		+100°
-		+150°
	> +180°	
	> +200°	



. 7.

(A-E)

(F-I)

A-B: ; A – *Palaeoscenidium cf. cladophorum* Deflandre; B – *Ornatoentactinia cf. solita* Afanasieva. 45

C-E: ; C – ; D – ; E – *Copicyntra acilaxa* Nazarov. 115

F – , *Haplentactinia sp.* ; G-H – , *Ommatodiscus sp.* ; I – , *Spongotrochus sp.* () 100

A-E – ; F-I –

[Kling, Boltovskoy, 1995].

0-300

« »

(. 7)

[, 1990, 2000; Afanasieva, 1990; Bohrmann et al., 1994].

(. 3).

30-40

60-70

[, 1987; 1990, 2000; Afanasieva, 1990;

, 2004].

Afanasieva, 1990; De Wever et al., 1994].

. . . , . . . , . . .
 , - . . . , -
 - ([, 2000].
 1000-1500)
 20-40° -
 , ,
 - [Bustillo et al., 1994].
 20° .
 , [2004]
 : 1) , 2)
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 40
 120° 1500-4000 .
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 120° , . . .
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 4000 . , , - , - ,
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 (.3) ,
 [, 1990, 2000; Afanasieva, 1990]. 0-500 ,
 , . . . , -
 , , (. 7 , B),
 ; ,
 ,
 , ,
 - [Paverd, Bjorklund, 1989]. «
 »
 [, 2000 ,] (. 7I). 500 (. 1, 2).
 -
 [, 1990,
 2000 ; , 1990].
 (. 7F), , (. 7G, H) -
 -
 .
 -
 (.
 7A, B).
 , ,

:

(«trophic resource continuum», [Hallock, 1987]),

SiO₂

0-200 [

, 1986; , 2004; Boltovskoy, 1998, 1999].

(. 2),

[, 1981, 1984; 1981, 1986].

[Boltovskoy, 1998, 1999].

(. 1),
»

500

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. XI

, 1990. . 13-14.

, 2000 . 209 .

//

2000 . . 49.

Prunobrachium //

. 2003. 4. . 78-83.

//

. 1990. 1. . 25-36.

1999. 7. 6. 41-55.
- (). :
2004. 22 .
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