WHOI DOCUMENT COLLECTION

Coll WHOI 1965 .W6 Cr. 7,8,9 v. 2 c. 1

U.S. PROGRAM IN BIOLOGY

INTERNATIONAL INDIAN OCEAN EXPEDITION

FINAL CRUISE REPORT

ANTON BRUUN CRUISES 7,8,9

VOLUME 2 (of 2)

INTERNATIONAL INDIAN OCEAN EXPEDITION

WOODS HOLE OCEANOGRAPHIC INSTITUTION

OCTOBER, 1965

U. S. PROGRAM IN BIOLOGY

INTERNATIONAL INDIAN OCEAN EXPEDITION

Final Report: R/V ANTON BRUUN, Cruises 7, 8 and 9

Volume 2 (of 2)

CONTENTS

Summary of Major Activities, Cruise 8 (Table 5)
(exclusive of benthic collections)

Summary of Benthic Collections, Cruise 8 (Table 6)

Reduced Oceanographic Data, Cruise 8

Bathythermograph Positions, Cruise 8

Biological Log - Plankton Collections, Cruise 8

Summary of Major Activities, Cruise 9 (Table 7)

Collecting Sites, Mombasa, Cruise 9 (Figure 4)

Collecting Sites, Grand Comoro, Cruise 9 (Figure 5)

Collecting Sites, Mayotta Island, Cruise 9 (Figure 6)

Collecting Sites, Aldabra Islands, Cruise 9 (Figure 7)

Collecting Sites, Farquhar Islands, Cruise 9 (Figure 8)

Collecting Sites, D'Arros and St. Joseph's Islands, Cruise 9 (Figure 9)

Collecting Sites, Seychelle Islands, Cruise 9 (Figure 10)

Bathythermograph Log, Cruise 9

Plankton Log, Cruise 9

Benthic Log, Cruise 9

Miscellaneous Biological Log, Cruise 9

Methods and Techniques (APPENDIX I)

List of Participants, Cruise 7 (APPENDIX II)

List of Participants, Cruise 8 (APPENDIX III)

List of Participants, Cruise 9 (APPENDIX IV)

Table 5 Summary of major activities - Cruise 8
(exclusive of benthic collections)

Station	Date	Position Latitude	Position Longitude	Hydro Cast	Prim. Prod.	Plankton Tows 75M25	Plankton Tows IOSN	Plankton Tows 75M3	NV-70
393	25 Sep 64	29°32'S	31°18'E	x	x			x	
394	25 Sep 64	29°26'S	31°33'E	x	x			x	
395	26 Sep 64	29°29'S	32°04'E	x	x		x	x	
396	28 Sep 64	25°34'S	38°19'E	x	x	x	x		x
397	28 Sep 64	25°10'S	33°15'E	x	x			x	
398	29 Sep 64	25°17'S	34°04'E	x	x	x	x		x
399	1 Oct 64	22°30'S	36°07'E	x	x	x	x		x
400	2 Oct 64	21°11'S	36°23'E	x	x		x		
401	3 Oct 64	20°42'S	35°50'E	x	x			x	
402	4 Oct 64	20°14'S	35°16'E	x	x			x	
403	9 Oct 64	19°10'S	36°19'E	x	x			x	
404	9 Oct 64	18°52'S	37°41'E	x	x	x	x		x
405	10 Oct 64	18°33'S	39°48'E	x	x		x		x
406	12 Oct 64	18°04'S	41°52'E	x	x	x	x		x
407	13 Oct 64	17°41'S	42°31'E	x	x		x		x
408	15 Oct 64	16°46'S	43°45'E	x	x			x	
409	17 Oct 64	16°13'S	43°41'E	x	x			x	
410	20 Oct 64	15°25'S	44°22'E	x	x	x	x		x
411	21 Oct 64	14°24'S	46°08'E	x	x	x	x		x
412	22 Oct 64	13°22'S	47°54'E	x	x	x	x		x
413	29 Oct 64	12°56'S	46°43'E	x	x	x	x		x
414	29 Oct 64	12°36'S	45°55'E	x	x	x	x		x
415	31 Oct 64	10°34'S	44°23'E	x	x	x	x		x
416	1 Nov 64	08°45'S	43°39'E	x	x	x	x		x
417	2 Nov 64	07°03'S	42°34'E	x	x	x	x		x
418	3 Nov 64	05°10'S	41°40'E	x	x	x	x		x
419	5 Nov 64	04°17'S	41°10'E	x	x	x	x		x
420	5 Nov 64	03°07'S	40°39'E	x	x	x	x		
421	6 Nov 64	02°56'S	40°23'E	x	x			x	

Table 6 Summary of Benthic and Miscellaneous Collections - Cruise 8

Station	Date	Position lat. (°S.)	Position long. (°E.)	Depth (m)	Gear & Remarks
393A	25 Sep 64	29°32'	31°17'	50-53	GMT
393B	"	29°32'	31°17'	53	Ockelman Dredge
394A	"	29°26'	31°32'	68	Ockelman Dredge
394B	"	29°27'	31°31'	68-70	GMT
395A	26 Sep 64	29°28'	32°05'	890	Ockelman Dredge
395B	"	29°32'	32°01'	750-820	GMT
395C	"	29°33'	32°00'	820	Ockelman Dredge
396A	28 Sep 64	25°34'	33°19'	450	Menzies Trawl
396B	"	25°32'	33°24'	450-455	GMT
396C	"	25°29'	33°35'	450	GMT
397A	29 Sep 64	25°12'	34°04'	230-295	GMT
397B	"	25°18'	34°04'	320	Ockelman Dredge
397C	"	26°07'	34°11'	600-665	GMT
397D	"	26°14'	34°04'	665	Ockelman Dredge
398B	1 Oct 64	22°25'	35°54'	740	GMT
398C	"	22°27'	35°50'	660	Ockelman Dredge
399A	"	22°33'	36°10'	925	Menzies Trawl
399B	"	22°30'	36°07'	850-960	GMT
399C	2 Oct 64	21°18'	36°18'	1510-1600	GMT
400A	"	21°12'	36°24'	1530	Menzies Trawl
400C	3 Oct 64	20°30'	35°43'	62	GMT
400D	"	20°30'	35°42'	62	GMT
400E	"	20°30'	35°55'	36-40	Hand Line
401B	4 Oct 64	19°50'	36°21'	65	GMT
401C	"	19°51'	36°21'	62	GMT
401D	"	19°49'	36°21'	62	Ockelman Dredge
401E	"	20°30'	35°55'	32	Ockelman Dredge
401F	"	20°30'	35°49'	32	GMT
401FF	"	19°48'	35°50'	24	Ockelman Dredge
401H	"	19°50'	35°49'	22	Hand Line
402A	"	20°14'		15	DLS

Station	Date	Position lat. (°S.)	Position long. (°E.)	Depth (m)	Gear & Remarks
403A	9 Oct 64	19°09'	36°20'	27-30	GMT
403B	"	19°09'	36°22'	30	Ockelman Dredge
403C	"	19°08'	36°41'	45	GMT
403D	"	19°04'	36°44'	45	Ockelman Dredge
403E	"	19°09'	36°55'	88	GMT
403F	"	19°09'	36°55'	88	Ockelman Dredge
403G	"	19°09'	36°55'	140-160	Ockelman Dredge
405C	11 Oct 64	18°22'	40°13'	2560	Menzies Trawl
405D	"	18°18'	40°53'	2190	Night Light
406A	12 Oct 64	18°05'	41°55'	400	Rock Dredge
406B	"	18°05'	41°55'		GMT
406D	13 Oct 64	18°27'	41°17'	2150	Deep Line
407A	"	18°24'	42°11'	2125	Menzies Trawl
407C	"	17°35'	43°02'	1360	GMT
407D	13/14 Oct 64	17°32'	43°05'	1360	Menzies Trawl
407E	14 Oct 64	17°30'	43°05'	1360	Night Light
407F	"	17°22'	43°07'	710	Deep Line
407G	"	17°22'	43°07'	710	Flag Line
407I	14/15 Oct 64	17°19'	43°14'	58	Hand Line
407J	15 Oct 64	16°44'	43°44'	58	GMT
408A	"	16°43'	43°43'	60	Ockelman Dredge
408B	"	16°40'	43°41'	60	GMT
408C	"	16°47'	43°19'	150-300	Menzies Trawl
408D	"	16°42'	43°19'	150-300	Rock Dredge
408F	16 Oct 64	16°21'	43°59'	27	Poison Station and Anchor Fishing
409A	17 Oct 64	16°12'	43°41'	400	Ockelman Dredge
409B	"	16°08'	43°34'	1260	Deep Line
409C	"	16°13'	43°46'	23	Hand Line
409E	18 Oct 64	16°11'	43°42'	62	Rock Dredge
409F	"	16°11'	43°53'	62	GMT
409G	"	16°12'	43°54'	75	Ockelman Dredge
409H	"	16°12'	43°54'	35	Drift
409I	19 Oct 64	16°03'	44°09'	25	GMT
409J	"	16°02'	44°14'	25	Ockelman Dredge

Station	Date	Position lat. (°S.)	Position long. (°E.)	Depth (m)	Gear & Remarks
409K	19 Oct 64	15°52'	44°23'	30	GMT
409L	"	15°58'	44°53'	20	Ockelman Dredge
409M	"	15°58'	45°02'	27	Hand Line
410A	20 Oct 64	15°07'	44°21'	3100	Menzies Trawl
412A	22 Oct 64	13°22'	47°53'		Ockelman Dredge
412B	"	12°47'	47°43'	25	Ockelman Dredge
412C	"	12°47'	47°42'	23	Hand Line
412D	"	12°46'	47°45'	44	GMT
412E	"	12°46'	47°45'	43	Hand Line
412F	"	12°45'	47°49'	750	Deep Line
412G	"	12°45'	47°50'	1000	Deep Line
412H	"	12°45'	47°50'	1000	Night Light
412I	23 Oct 64	12°43'	48°12'	280-410	Ockelman Dredge
412J	"	12°42'	48°14'	58-110	Ockelman Dredge
412K	"	12°53'	48°13'	30	Hand Line
413A	29 Oct 64	12°32'	45°50'	3530	Menzies Trawl
414A	30 Oct 64	12°07'	44°12'	2100	Night Light
414B	"	12°08'	44°12'	640	Deep Line
414C	"	12°08'	44°12'	1000	Deep Line
416A	1 Nov 64	08°45'	43°39'	3850	Menzies Trawl
416B	"	08°45'	43°39'	3850	Night Light
418A	3 Nov 64	05°11'	41°38'	3050	Menzies Trawl
418B	"	05°08'	41°37'	3050	Night Light
418C	4 Nov 64	04°11'	40°59'	1500	Deep Line
418D	"	04°11'	40°59'	1500	Deep Line
418E	"	04°11'	40°57'	1500	Flag Line
418F	"	04°14'	40°59'	1550	Menzies Trawl
418G	"	04°15'	41°00'	1600	GMT
419A	5 Nov 64	03°42'	40°44'	820	GMT
419B	"	03°33'	40°54'	910	Menzies Trawl
419C	"	03°38'	40°55'	1125	GMT
419D	"	03°12'	40°37'	440	Ockelman Dredge

Station	Date	Position lat. (°S.)	Position long. (°E.)	Depth (m)	Gear & Remarks
420A	6 Nov 64	02°42'	40°53'	140	GMT
420B	"	02°43'	40°55'	145	Ockelman Dredge
421A	7 Nov 64	02°54'	40°23'	34	Ockelman Dredge
421B	"	02°54'	40°23'	34	Rock Dredge
421C	"	02°54'	40°25'	150	Ockelman Dredge
421D	"	02°54'	40°25'	150	Rock Dredge
421E	"	02°52'	40°28'	250	Ockelman Dredge
421F	"	02°50'	40°28'	250	Rock Dredge
421G	8 Nov 64	02°56'	40°28'	240	GMT
421H	"	02°50'	40°31'	290	GMT
421I	"	02°47'	40°34'	225	GMT

REDUCED DATA

U. S. PROGRAM IN BIOLOGY — INTERNATIONAL INDIAN OCEAN PROGRAM

STATION NO. 393
CRUISE NO. 8
VESSEL *R/V ANTON BRUUN*
DATE 25-IX-64
RELIABILITY OF DEPTH

LAT. 29° 32'S
LONG. 31° 18'E
DEPTH 47 m.
TIME 1327
WIND Force 5; Dir. 21

PRIMARY PROD. 1.85 g C /m²/day
EXT. COEFF. (k) 0.13
RADIATION 132.1 g.cal./cm²/day
ZOOPLANKTON VOL.
IOSN STD. TOW ml./m.²

DEPTH	TEMP.	SAL. ‰	O_2 ml./l.	PO_4-P µgA/l.	NO_3-N µgA/l.	NO_2-N µgA/l.	SiO_3 Si µgA/l.			DEPTH	Chl. a µg/l.	INSITU C^{14} µgC/l./d	C^{14}-1000 fc µgC/l./d.	
1	20.14	35.372	5.55	0.21	1.2	0.47	4.5			1	2.38	95.4	181.4	
11	20.16	35.372	5.53	0.24	1.3	0.51	5.2			5	2.23	132.4	215.5	
26	20.14	35.372	5.37	0.22	1.4	0.53	2.8			11	2.43	93.8	197.0	
35	18.56	35.468	4.57	0.48	5.2	0.46	7.2			18	2.25	23.3	189.4	
45	17.98	35.482	4.35	0.56	6.3	0.32	8.7			36	0.58	10.7	32.4	

REDUCED DATA

U. S. PROGRAM IN BIOLOGY — INTERNATIONAL INDIAN OCEAN PROGRAM

STATION NO. 394
CRUISE NO. 8
VESSEL *R/V ANTON BRUUN*
DATE 25-IX-64
RELIABILITY OF DEPTH

LAT. 29°26'S
LONG. 31°33'E
DEPTH 68 m.
TIME 1827
WIND Force 5, Dir. 15

PRIMARY PROD. .01 g C /m²/day
EXT. COEFF. (k) 0.13
RADIATION 178.3 g.cal./cm²/day
ZOOPLANKTON VOL.
IOSN STD. TOW ml./m.²

DEPTH	TEMP.	SAL. ‰	O_2 ml./l.	PO_4-P µgA/l.	NO_3-N µgA/l.	NO_2-N µgA/l.	SiO_3 Si µgA/l.		
1	19.92	35.475	5.50	0.17	0.5	0.02	1.1		
9	19.96	35.466	5.46	0.18	0.4	0.02	1.8		
23	19.94	35.466	5.46	0.18	0.5	0.01	1.2		
36	19.93	35.474	5.46	0.17	0.3	µ	0.9		
45	19.92	35.470	5.46	0.17	0.4	0.02	1.3		
59	17.07	35.434	5.22	0.78	7.4	0.18	7.7		

DEPTH	Chl. a µg/l.	INSITU C^{14} µgC/l./d	C^{14}-1000 fc µgC/l./d.	
1	1.92	0.3	0.1	
5	1.85	0.6	1.1	
11	1.98	0.2	0.8	
18	2.06	0.6	1.0	
36	2.26	0.2	µ	

REDUCED DATA

U. S. PROGRAM IN BIOLOGY — INTERNATIONAL INDIAN OCEAN PROGRAM

STATION NO. 395
CRUISE NO. 8
VESSEL *R/V ANTON BRUUN*
DATE 26-IX-64
RELIABILITY OF DEPTH

LAT. 29°29'S
LONG. 32°04'E
DEPTH 890 m.
TIME 0645
WIND Force 4, Dir. 13

PRIMARY PROD. .27 g C /m²/day
EXT. COEFF. (k) 0.09
RADIATION 203.0 g.cal./cm.²/day
ZOOPLANKTON VOL.
IOSN STD. TOW 11.0 ml./m.²

DEPTH	TEMP.	SAL. ‰	O_2 ml./l.	PO_4-P µgA/l.	NO_3-N µgA/l.	NO_2-N µgA/l.	SiO_3 Si µgA/l.		
1	21.49	35.420	5.24	0.12	0.4	0.03	1.7		
59	20.51	35.385	4.65	0.34	3.4	0.16	4.2		
93	17.95	35.436	3.99	0.59	7.6	0.06	7.4		
127	16.92	35.518	4.62	0.45	5.7	0.03	5.5		
165	15.65	35.493	5.02	0.49	6.2	0.03	4.7		
214	14.43	35.372	4.79	0.65	7.8	0.01	6.4		
311	12.99	35.273	5.35	0.72	7.9	0.05	4.8		
409	11.91	35.130	5.39	0.82	8.9	0.04	4.7		
605	9.06	34.767	4.99	1.28	10.0	0.04	10.8		
852	4.78	34.646	3.44	2.21	31.8	0.08	59.2		

DEPTH	Chl. a µg/l.	INSITU C^{14} µgC/l./d	C^{14}-1000 fc µgC/l./d.	
1	0.32	2.7	37.7	
8	0.39	6.1	26.9	
15	0.35	7.5	38.3	
26	0.44	6.6	36.8	
52	0.33	2.3	17.4	

REDUCED DATA

U. S. PROGRAM IN BIOLOGY — INTERNATIONAL INDIAN OCEAN PROGRAM

STATION NO. 396
CRUISE NO. 8
VESSEL *R/V ANTON BRUUN*
DATE 28-IX-64
RELIABILITY OF DEPTH

LAT. 25° 34' S
LONG. 33° 19' E
DEPTH 450 m.
TIME 0940
WIND Force 3, Dir. 20

PRIMARY PROD. .66 g C /m²/day
EXT. COEFF. (k) 0.069
RADIATION 309.5 g.cal./cm²/day
ZOOPLANKTON VOL.
IOSN STD. TOW 10.0 ml./m.²

DEPTH	TEMP.	SAL. ‰	O_2 ml./l.	PO_4-P µgA/l.	NO_3-N µgA/l.	NO_2-N µgA/l.	SiO_3 Si µgA/l.			DEPTH	Chl. a µg/l.	INSITU C^{14} µgC/l./d	C^{14}-1000 fc µgC/l./d.	
1	23.00	35.291	5.40	0.21	0.2	0.01	3.5			1	0.17	15.7	18.6	
31	22.92	35.283	5.21	0.16	0.1	0.01	2.8			10	0.19	11.7	65.3	
56	21.34	35.387	4.82	0.31	2.2	0.28	3.5			20	0.21	12.9	70.1	
81	18.65	35.374	3.97	0.52	6.6	0.09	6.5			33	0.18	13.1	22.9	
106	18.23	35.390	3.83	0.70	9.4	0.05	7.9			66	0.27	2.0	49.5	
131	16.93	35.469	4.27	0.60	7.4	0.06	7.1							
156	15.98	35.420	4.28	0.60	9.1	0.07	8.1							
206	13.79	35.314	4.63	0.60	9.9	0.05	6.8							
305	12.09	35.130	4.92	0.88	11.6	0.08	6.1							
445	10.77	34.972	4.87	1.01	15.6	0.09	9.3							

REDUCED DATA

U. S. PROGRAM IN BIOLOGY — INTERNATIONAL INDIAN OCEAN PROGRAM

STATION NO. 397
CRUISE NO. 8
VESSEL *R/V ANTON BRUUN*
DATE 28-IX-64
RELIABILITY OF DEPTH

LAT. 25°10'S
LONG. 33°15'E
DEPTH 60 m.
TIME 2028
WIND Force 4; Dir. 12

PRIMARY PROD. 2.17 g C /m²/day
EXT. COEFF. (k) 0.069
RADIATION 215.1 g.cal./cm²/day
ZOOPLANKTON VOL.
IOSN STD. TOW ml./m.²

DEPTH	TEMP.	SAL. ‰	O_2 ml./l.	PO_4-P µgA/l.	NO_3-N µgA/l.	NO_2-N µgA/l.	SiO_3 Si µgA/l.		
1	22.48	35.329	5.34	0.21	0.3	0.00	1.4		
14	22.43	35.337	5.35	0.16	0.2	0.02	1.2		
28	22.12	35.327	5.39	0.21	0.2	0.01	1.3		
42	21.93	35.390	5.30	0.19	0.4	0.03	1.3		
56	21.42	35.422	5.15	0.30	0.4	0.17	1.9		

DEPTH	Chl. a µg/l.	INSITU C^{14} µgC/l./d	C^{14}-1000 fc µgC/l/d.	
1	0.48	55.8	45.9	
10	0.40	35.5	43.7	
20	0.60	30.3	46.4	
33	0.64	38.3	66.5	
59	0.94	37.3	15.9	

REDUCED DATA

U. S. PROGRAM IN BIOLOGY — INTERNATIONAL INDIAN OCEAN PROGRAM

STATION NO. 398
CRUISE NO. 8
VESSEL *R/V ANTON BRUUN*
DATE 29-IX-64
RELIABILITY OF DEPTH

LAT. 25°17'S
LONG. 34°04'E
DEPTH 650 m.
TIME 0918
WIND Force 4, Dir. 13

PRIMARY PROD. 1.57 g C /m²/day
EXT. COEFF. (k) 0.069
RADIATION 330.7 g.cal./cm²/day
ZOOPLANKTON VOL.
IOSN STD. TOW 17.0 ml./m.²

DEPTH	TEMP.	SAL. ‰	O_2 ml./l.	PO_4-P µgA/l.	NO_3-N µgA/l.	NO_2-N µgA/l.	SiO_3 Si µgA/l.		
1	22.45	35.311	5.23	0.15	0.3	0.02	2.2		
11	22.45	35.311	5.23	0.16	0.2	0.02	2.4		
26	21.70	35.414	5.22	0.13	0.4	0.01	1.3		
61	21.56	35.412	5.17	0.18	0.3	0.03	1.9		
86	19.75	35.400	4.21	0.52	4.9	0.12	5.9		
111	17.95	35.380	3.63	0.80	7.6	0.02	7.9		
135	17.06	35.375	3.67	0.85	8.6	0.04	8.8		
185	14.97	35.336	4.14	0.88	9.9	0.07	8.8		
285	11.34	35.189	4.82	1.08	11.9	0.02	8.5		
385	8.76	34.764	4.42	1.60	18.0	0.07	18.5		
654	6.88	34.731	3.10	2.23	26.6	0.01	45.3		

DEPTH	Chl. a µg/l.	INSITU C^{14} µgC/l./d	C^{14}-1000 fc µgC/l./d.	
1	0.28	26.9	10.2	
10	0.27	33.2	9.3	
20	0.30	29.2	12.6	
33	0.16	19.9	12.1	
66	0.32	20.5	22.1	

REDUCED DATA

U. S. PROGRAM IN BIOLOGY — INTERNATIONAL INDIAN OCEAN PROGRAM

STATION NO. 399
CRUISE NO. 8
VESSEL *R/V ANTON BRUUN*
DATE 1-X-64
RELIABILITY OF DEPTH

LAT. 22°30'S
LONG. 36°07'E
DEPTH 975 m.
TIME 1335
WIND Force 4, Dir. 02

PRIMARY PROD. .28 g C /m²/day
EXT. COEFF. (k) 0.05
RADIATION 331.2 g.cal./cm²/day
ZOOPLANKTON VOL.
IOSN STD. TOW 9.0 ml./m.²

DEPTH	TEMP.	SAL. ‰	O_2 ml./l.	PO_4-P µgA/l.	NO_3-N µgA/l.	NO_2-N µgA/l.	SiO_3 Si µgA/l.		
1	24.83	35.059	5.10	0.25	0.1	0.01	2.7		
34	24.68	35.055	5.11	0.20	0.2	0.04	2.7		
68	23.65	35.108	4.87	0.27	1.3	0.24	2.7		
98	21.89	35.200	4.04	0.45	4.7	0.09	5.1		
127	19.40	35.288	3.48	0.76	9.7	0.05	8.6		
156	18.18	35.315	3.43	0.83	10.3	0.06	9.4		
205	15.78	35.307	3.49	1.00	12.9	0.05	11.9		
303	13.63	35.223	3.97	1.00	13.5	0.07	11.1		
400	12.03	35.113	4.45	1.06	14.4	0.05	9.8		
596	9.66	34.835	4.58	1.31	18.9	0.02	13.7		
792	7.66	34.723	3.45	1.99	26.6	0.03	35.5		
963	5.54	34.775	2.54	2.44	33.0	0.04	69.1		

DEPTH	Chl. a µg/l.	INSITU C^{14} µgC/l./d	C^{14}-1000 fc µgC/l./d.	
1	0.12	4.1	6.2	
14	0.12	1.1	5.2	
28	0.04	3.5	8.2	
47	0.15	3.3	12.9	
94	0.19	3.1	4.6	