Onboard Results from Sediment Samplings on the R.V. Tansei-maru Cruises KT00-14 in the Southwestern Marginal Part of the Japan Sea and KT00-17 in the Northeastern Marginal Part of the East China Sea

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Onboard Results from Sediment Samplings on the R.V. *Tansei-maru* Cruises KT00-14 in the Southwestern Marginal Part of the Japan Sea and KT00-17 in the Northeastern Marginal Part of the East China Sea

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1. INTRODUCTION AND PURPOSES OF CRUISES

Marine geology and micropalaeontology were investigated in the southwestern marginal part of the Japan Sea from the 24th of September to the 2nd of October 2000, and the northeastern marginal part of the East China Sea off Nagasaki from the 11th to 17th December, 2000 during the R. V. *Tansei-maru* cruises KT00-14 and KT00-17, respectively, as parts in a series on pursuing time-spatial distribution of depositional facies and spatial distribution of present micro-organisms in the Japan Sea. This cruise report is concerned with the results of sediment samplings at these cruises and onboard observations of them. Sedimentological and micropalaeontological analyses in the laboratory of them have been under the investigations.

Many geological, geophysical and micropalaeontological studies have been made in the Japan Sea mainly by the Hydrographic Department, M. S. A., Japan (*e. g.* Iwabuchi, 1968), the Geological Survey of Japan (*e. g.* Arita and Okamura, 1989), Ocean Research Institute, the University of Tokyo (*e. g.* Kobayashi ed., 1984), the DSDP/ODP (*e. g.* Ingle et al., 1990) and others (*e. g.* Oba *et al.*, 1991 ; Tsukawaki *et al.*, 1993, 1997, 1998, 1999, 2000, 2001). These studies have been also reported in the East China Sea (*e. g.* Niino and Emery, 1961 ; Ishizaki, 1984 ; Li and Okada, 1985 ; Xu *et al.*, 1995 ; Oba, 1997 ; Oguri *et al.*, 1998).

Taking these previous studies into account, piston coring and grab surface sampling sites were selected mainly in (1) the continental shelves southwest and northeast off the Tsushima Islands and (2) the Tsushima Basin and the related continental slope and shelf northwest off the Shimane Peninsula in the Japan Sea at the KT00-14 cruise, and (3) the Danjo Basin and related continental slope and shelf southwest off Nagasaki, West Kyushu in the East China Sea, and (4) the continental slope southeast off Kyushu

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in the Pacific at KT00-17 cruise for the purposes of the following scientific searching ; (1) spatial distribution of surface sediments and micro-organisms in the Tsushima Strait area as the entrance of the Tsushima warm current into the Japan Sea, (2) time-spatial distribution of depositional facies in the slope of the Tsushima Basin and spatial distribution of surface sediments and micro-organisms in the continental shelf and slope northwest off the Shimane Peninsula, (3) spatial distribution of surface sediments and micro-organisms in the Danjo Basin and related continental shelf and slope southwest off Nagasaki, and (4) palaeoclimatic and palaeoenvironmental changes of the northwestern marginal part of the Pacific (Fig. 1).

2. SAMPLING METHODS

Six or four metres-long stainless-steel pipe piston core samplers with a 600 kg weight and a 70-cm-long Nasu type pilot core sampler were utilized to obtain cored sediments, and an Okean type grab sampler were used to obtain bottom surface sediments and benthic organisms during both cruises..

3. RESULTS OF SEDIMENT SAMPLINGS AND ONBOARD OBSERVATION OF SEDIMENTS

Two piston cored sediments from two sites and 31 grab surface sediments were successfully obtained from two survey areas in the southwestern marginal part of the Japan Sea of the KT00-14 cruise (Table 1). Eleven grab surface sediments were obtained from off Nagasaki in the northeastern marginal part of the East China Sea, but only pilot cored sediments, 67 cm long, were recovered from one site KT00-17 P-2 in the Pacific during the KT00-17 cruise (Table 2).

3-1. Continental Shelves around the Tsushima Islands

Surface sediments of the continental shelves around the Tsushima Islands are composed mainly of mollus can shell and shell fragments bearing fine- to medium-grained sand in the southwest of the area (G-1 to G-7 : Plate 1, figs. 1 and 2) with an exception of it in the site KT00-14 G-8 (Plate 1, fig. 3) where molluscan shell fragments bearing muddy sand is distributed. On the other hand, in the northeast of the area, the sediments in the north four sites (G-12 to G-15 : Plate 1, fig. 6) and it from the basin plain of the Tsushima Trough (G-10 : Plate 1, fig. 4) are composed of mollus can shell and shell fragments rich muddy sand or fine- to medium-grained sand, but they in the south four sites (G-16 to G-19 : Plate 1, figs. 7 and 8) and it to the north of the islands (G-11 : Plate 1, fig. 5) consist of molluscan shell and shell fragments rich coarse- to very coarse - grained sand or calcareous coarse - grained sand.

3-2. Continental Shelf and Slope Northwest off the Shimane Peninsula and the Tsushima Basin

Surface sediments of the continental shelf northwest off the Shimane Peninsula and the continental slope of the Tsushima Basin consist of molluscan shell fragments bearing dark olive grey very fine- to fine-grained sand in three shallowest sites from the upper shelf (G-20 to G-22 : Plate 2, figs. 1 and 2), molluscan shell fragments bearing dark olive grey sandy mud in four sites from the lower shelf and the uppermost slope areas (G-23 to G-26 : Plate 2, figs. 3, 4 and 5), and moderate olive grey homogeneous mud in six sites from the upper to middle slope area (G-27 to G-32 : Plate 2, figs. 6, 7 and 8). Cored sediments KT00-14 P-1, about 520 cm long, obtained from the middle slope of the Tsushima Basin at a water depth of 1,089m is composed mainly of olive grey homogeneous mud judging from the horizontal cutting surfaces, but cored sediments P-2, about 120 cm long, obtained in the lower shelf off the Shimane Peninsula at a water depth of 156 m consist of the upper soft olive grey

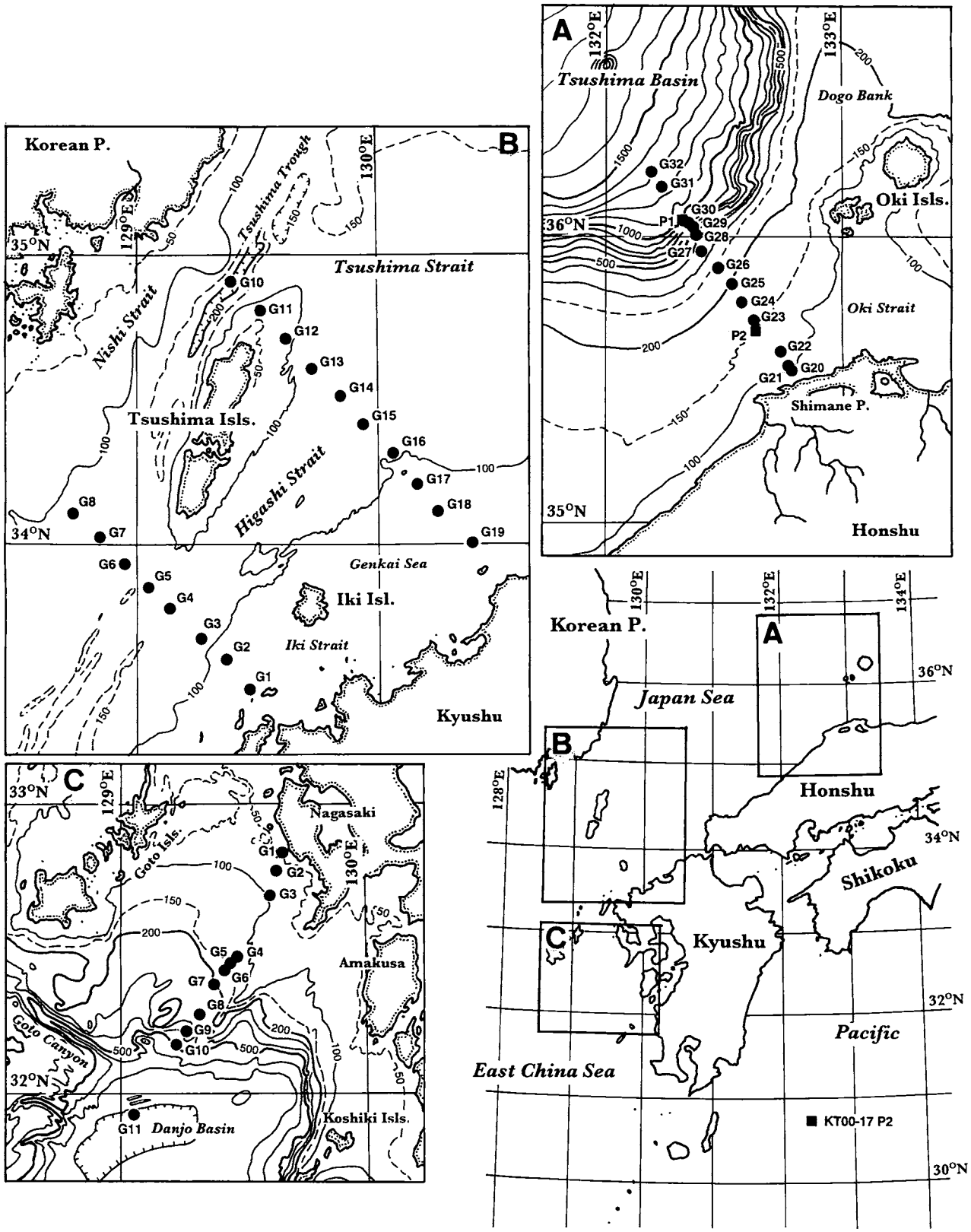

Fig. 1: Submarine topographies of the studied areas in the southwestern part of the Japan Sea off the Shimane Peninsula (A), the southwestern marginal part of the Japan Sea around the Tsushima Islands (B), and the northeastern marginal part of the East China Sea southwest off Nagasaki (C) (solid circle: grab surface sampling site, solid square: piston coring site, based on Hydrographic Department, M. S. A., Japan, 1981).

Table 1 : Results of sampling on the R. V. *Tansei-maru* Cruise KT00-14 in the southwestern part of the Japan Sea off the Shimane Peninsula and the southwestern marginal parts of the sea around the Tsushima Islands.

Station	Locality	Date (D/M/Y)	Time Hit	Longitude (E)	Latitude (N)	Water Depth (m)	Sediment Thickness (cm)	Sediment Type
G-1	SW Tsushima	25/09/00	18:48	129 28.0	33 29.9	77	4	molluscan shell bearing grey fine to medium-grained sand
G-2	SW Tsushima	25/09/00	19:41	129 21.8	33 35.2	98	3	molluscan shell bearing grey fine to medium-grained sand
G-3	SW Tsushima	25/09/00	20:34	129 15.5	33 40.6	104	3	molluscan shell bearing grey fine to medium-grained sand
G-4	SW Tsushima	25/09/00	21:34	129 08.7	33 46.3	120	6	molluscan shell bearing grey fine to medium-grained sand
G-5	SW Tsushima	25/09/00	22:23	129 03.3	33 50.7	119	5	molluscan shell bearing grey fine to medium-grained sand
G-6	SW Tsushima	25/09/00	23:16	128 56.9	33 55.6	131	3	molluscan shell bearing grey fine to medium-grained sand
G-7	SW Tsushima	26/09/00	00:10	128 51.0	34 00.7	120	3	molluscan shell bearing grey fine to medium-grained sand
G-8	SW Tsushima	26/09/00	01:11	128 44.1	34 06.3	107	3	molluscan shell bearing olive grey fine to medium-grained muddy sand
G-10	NE Tsushima	26/09/00	18:07	129 24.5	34 54.2	227	6	molluscan shell and shell fragments bearing olive grey muddy sand
G-11	NE Tsushima	26/09/00	20:09	129 31.4	34 48.1	82	8	coarse- to very coarse-grained calcareous sand
G-12	NE Tsushima	26/09/00	21:12	129 38.0	34 42.0	94	18	molluscan shell rich bearing olive grey muddy sand
G-13	NE Tsushima	26/09/00	22:14	129 44.5	34 35.9	108	18	molluscan shell rich bearing olive grey muddy sand
G-14	NE Tsushima	26/09/00	23:14	129 51.0	34 30.0	112	8	molluscan shell rich bearing olive grey muddy sand
G-15	NE Tsushima	27/09/00	00:14	129 57.4	34 24.3	122	8	molluscan shell fragment bearing grey f.- to m.-grained sand
G-16	NE Tsushima	27/09/00	01:15	130 04.2	34 18.2	100	3	coarse- to very coarse-grained calcareous sand
G-17	NE Tsushima	27/09/00	18:57	130 10.2	34 12.0	93	3	coarse- to very coarse-grained calcareous sand
G-18	NE Tsushima	27/09/00	19:54	130 15.3	34 06.1	83	5	molluscan shell bearing coarse- to very coarse-grained sand
G-19	NE Tsushima	27/09/00	21:04	130 23.4	34 00.0	65	8	molluscan shell bearing coarse- to very coarse-grained sand
G-20	off Shimane	30/09/00	09:40	132 47.1	35 31.0	95	20	molluscan shell fragment bearing dark olive grey muddy f-grained sand
G-21	off Shimane	30/09/00	10:11	132 46.7	35 31.6	100	20	molluscan shell fragment bearing dark olive grey muddy f-grained sand
G-22	off Shimane	30/09/00	10:49	132 43.8	35 34.6	124	15	molluscan shell fragment bearing dark olive grey muddy vf-grained sand
G-23	off Shimane	30/09/00	11:57	132 38.4	35 41.2	155	-	*- no sampling due to disturbance of surface sediments -*
G-23'	off Shimane	30/09/00	12:10	132 38.4	35 41.3	155	20	molluscan shell fragment bearing dark olive grey sandy mud
G-24	off Shimane	30/09/00	13:01	132 35.3	35 45.1	176	19	molluscan shell fragment bearing dark olive grey sandy mud
G-25	off Shimane	30/09/00	13:56	132 31.8	35 49.1	201	18	molluscan shell fragment bearing dark olive grey sandy mud or mud
G-26	off Shimane	30/09/00	14:41	132 28.1	35 53.5	254	10	molluscan shell fragment bearing dark olive grey sandy mud or mud
G-27	off Shimane	30/09/00	15:51	132 24.9	35 57.0	360	16	moderate olive grey homogeneous mud covered by brownish grey soupy mud
G-28	off Shimane	30/09/00	16:29	132 23.1	35 59.7	514	20	moderate olive grey homogeneous mud covered by brownish grey soupy mud
G-29	off Shimane	30/09/00	17:54	132 22.5	36 01.2	744	3	moderate olive grey soupy mud overlying on semi-consolidated olive grey mud
G-30	off Shimane	30/09/00	19:36	132 21.3	36 02.5	1011	20	moderate olive grey homogeneous mud covered by brownish grey soupy mud
G-31	off Shimane	30/09/00	22:07	132 14.9	36 10.4	1296	20	moderate olive grey homogeneous mud covered by brownish grey soupy mud
G-32	off Shimane	30/09/00	23:04	132 11.8	36 13.2	1353	18	moderate olive grey homogeneous mud covered by brownish grey soupy mud
P-1	off Shimane	01/10/00	08:33	132 19.9	36 03.5	1089	520	moderate olive grey homogeneous mud in cutting surfaces
P-2	off Shimane	01/10/00	11:54	132 38.2	35 41.4	156	120	semi-consolidated sandy mudstone with molluscan fossils covered by bluish-grey soft mud

Table 2 : Results of sampling on the R. V. *Tansei-maru* Cruise KT00-17 in the northeastern marginal part of the East China Sea southwest off Nagasaki, and the northwestern part of the Pacific southeast off Kyushu.

Station	Locality	Date (D/M/Y)	Time Hit	Longitude (E)	Latitude (N)	Water Depth (m)	Sediment Thickness (cm)	Sediment Type
G-1	SW Nagasaki	11/12/00	17:00	129 39.8	32 50.2	52	15	calcareous frg bearing olive grey f.sand covered by brown soft mud
G-2	SW Nagasaki	11/12/00	16:42	129 38.6	32 45.8	74	18	calcareous frg bearing olive grey f.sand covered by brown soft mud
G-3	SW Nagasaki	11/12/00	17:27	129 35.7	32 41.6	100	10	calcareous frg bearing olive grey f.sand covered by greyish brown soft mud
G-4	SW Nagasaki	11/12/00	19:12	129 26.9	32 28.4	125	3	calcareous frg rich dark grey f-m sand
G-5	SW Nagasaki	11/12/00	19:45	129 26.3	32 27.9	156	8	calcareous frg bearing olive grey f-m sand covered by yellowish grey f.sand
G-6	SW Nagasaki	12/12/00	14:32	129 25.8	32 26.5	175	4	calcareous frg bearing yellowish grey f.sand
G-7	SW Nagasaki	12/12/00	15:14	129 23.1	32 22.8	203	5	molluscan shell bearing dark olive grey f.sand covered by pale coloured sand
G-8	SW Nagasaki	12/12/00	16:15	129 18.7	32 16.4	254	10	calcareous frg bearing dark olive grey f.sand
G-9	SW Nagasaki	12/12/00	17:09	129 15.7	32 12.5	360	10	calcareous frg bearing dark olive grey f.sand
G-10	SW Nagasaki	12/12/00	18:12	129 12.9	32 09.8	502	18	homobeneous olive grey muddy f.sand, soupy surface
G-11	SW Nagasaki	12/12/00	20:19	129 03.0	31 57.3	800	20	homogeneous olive grey mud covered by reddish brown mud
P-2	S off Toi Knoll	14/12/00	09:06	132 21.9	30 46.0	2793	67 (pilot)	homogeneous olive grey mud covered by 4 cm thick reddish brown mud

mud, about 50 cm thick, and the lower molluscan fossil bearing consolidated muddy sandstone.

3-3. Continental Shelf and Slope Southwest off Nagasaki, and the Danjo Basin

In the continental shelf southwest off Nagasaki in the northeastern marginal part of the East China Sea, and the slope and basin plain areas of the Danjo Basin, surface sediments are composed mainly of molluscan shell, shell fragments and reworked calcareous materials rich olive grey fine-grained sand in the shelf and upper slope areas at water depths of 52 to 360 m (G-1 to G-9 : Plate 3, figs. 1 to 6), homogeneous olive grey muddy sand in the lower slope area at a water depth of 502 m (G-10 : Plate 3, fig. 7), and homogeneous olive grey mud in the basin plain at a water depth of 800 m (G-11 : Plate 3, fig. 8). Pilot cored sediments, 67 cm long, obtained southeast off Kyushu in Northwest Pacific at a water depth of 2,793 m consist of olive grey homogeneous mud covered by a 5 cm thick

reddish brown soft mud.

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日本海南西端部ならびに東シナ海北東端部における淡青丸 KT 00-14 次および KT 00-17 次航海の採泥結果

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要　旨

2000年9月24日～10月2日に実施された日本海南西端部対馬周辺および同海南西部島根半島沖での海洋研究船淡青丸の研究航海 KT 00－14 において，対馬周辺海域から18点の海底表層堆積物が，また島根半島沖陸棚から対馬海盆斜面にかけての海域から2点の柱状試料および13点の海底表層堆積物がそれぞれ採取された。一方，同年12月11～17日に行われた東シナ海北東端部長崎沖および九州南東方北西太平洋での同17次航海では，長崎沖陸棚から男女海盆斜面をへて同海盆底にかけての海域から11点の海底表層堆積物が，また九州南東方の北西太平洋からは67 cm長のパイロットコア堆積物試料がそれぞれ回収された。

対馬周辺海域の表層堆積物は，南西側測線最北の試料G 8が貝殻片を含む泥質砂からなるのをのぞいてはいずれも貝殻片を多量に含む細～中粒砂から構成される。一方北東側測線では，対馬トラフ底の試料G 10ならびに北側の4試料(G 12～15)がいずれも貝殻片を多量に含む泥質砂あるいは細～中粒砂からなるのに対し，南側の4試料(G 16～19)および対馬北方の試料G 11は貝殻片を多量に含む粗～極粗粒砂あるいは石灰質砂から構成される。

島根半島北西沖陸棚から対馬海盆斜面にかけての表層堆積物は，水深124 mまでの上部陸棚の試料（G 20～22）は貝殻片をともなう濃オリーブ色の極細～細粒砂，水深254 mまでの下部陸棚および斜面最上部の試料（G 23～26）は貝殻片を含む濃オリーブ色の砂質泥，それ以深1353 mまでの試料（G 27～32）はオリーブ色の泥からそれぞれ構成される。なお，水深1,089 mの斜面から回収されたピストン柱状試料P 1がオリーブ色の泥から構成されるのに対し，水深156 mの下部陸棚から採取された同試料P 2は表層部約50 cmがオリーブ色の泥，それ以下は貝化石を含む泥質砂岩からなる。

一方，長崎南西沖陸棚から斜面をへて男女海盆底にいたる表層堆積物は，水深360 mまでの陸棚および上部斜面の試料（G 1～9）は再堆積性と判断される石灰質堆積物を多量に含むオリーブ色の細粒砂，下部斜面の試料（G 10）はオリーブ色の泥質砂，そして海盆底の試料（G 11）はオリーブ色の均質な泥からそれぞれ構成される。なお，九州南東方の水深2,793 mから得られたパイロットコア堆積物はオリーブ色の均質な泥から構成され表層部4 cmには軟弱な赤褐色泥が確認される。

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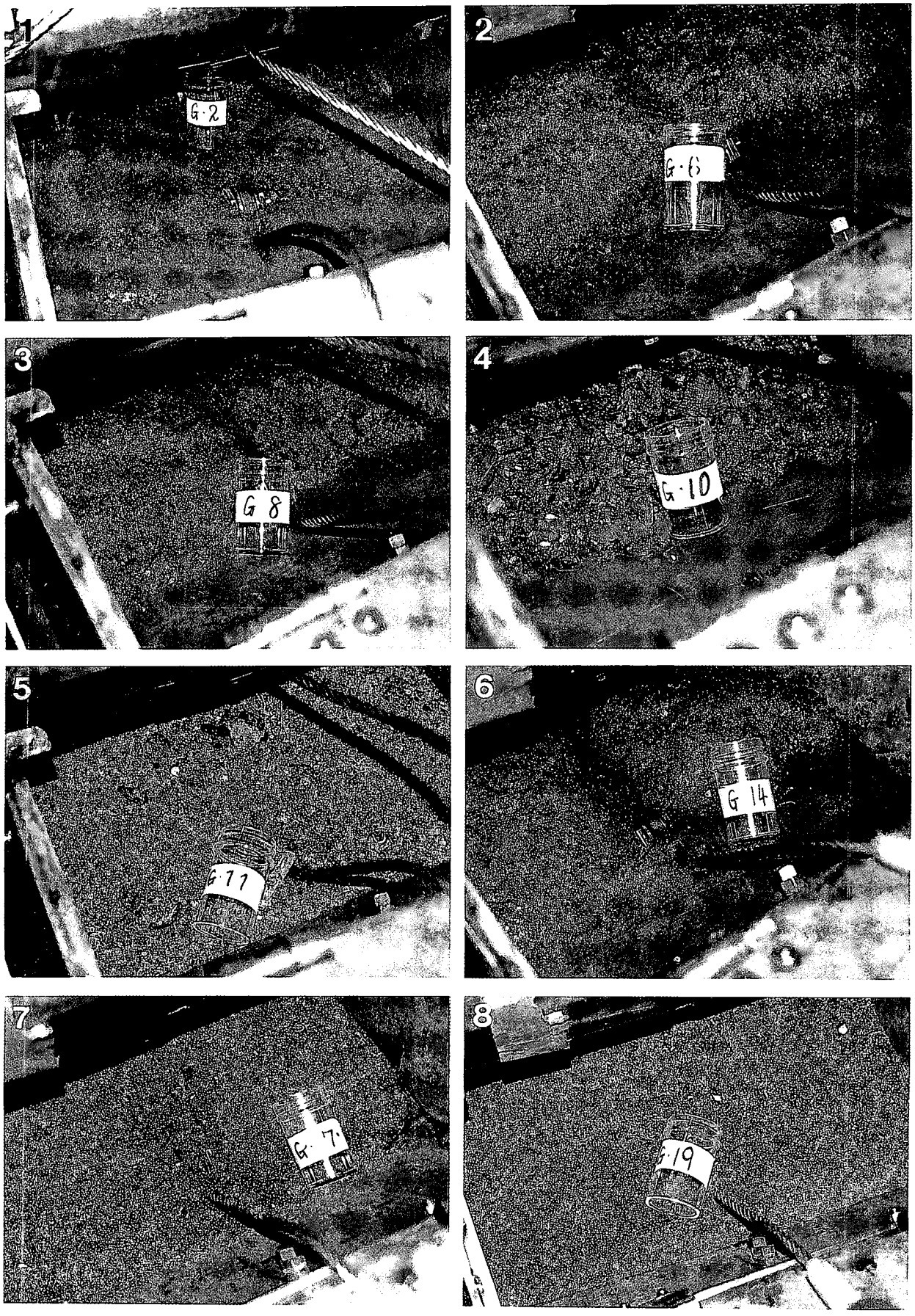
Plate 1



Explanation of Plate 1

Photographs of grab surface sediments around the Tsushima Islands in the southwestern marginal part of the Japan Sea immediate after the recovery (The sample bottle, 40 mm in diameter, gives scale).

fig. 1. **Molluscan shell and shell fragments bearing grey fine- to medium-grained sand at the site G-2, 98 m deep.**

fig. 2. **Molluscan shell and shell fragments bearing grey fine- to medium-grained sand at the site G-6, 131 m deep.**

fig. 3. **Molluscan shell and shell fragments bearing olive grey fine- to medium-grained muddy sand at the site G-8, 107 m deep.**

fig. 4. **Molluscan shell and shell fragments rich olive grey muddy fine-grained sand at the site G-10, 227 m deep.**

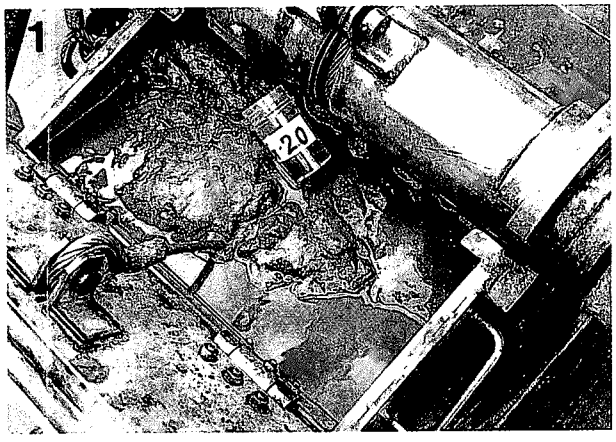
fig. 5. **Molluscan shell and shell fragments rich coarse- to very coarse-grained sand at the site G-11, 82 m deep.**

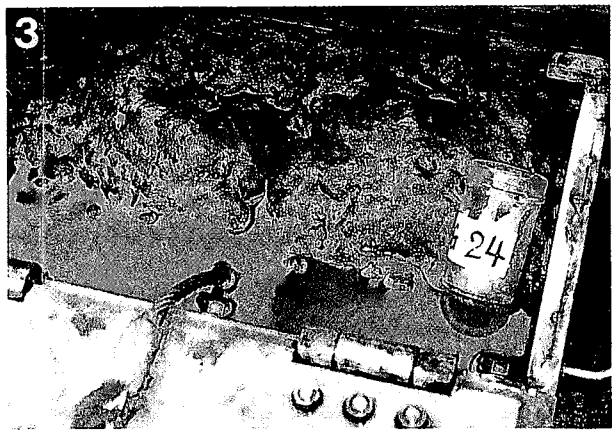
fig. 6. **Molluscan shell fragments rich olive grey muddy fine-grained sand at the site G-14, 112 m deep.**

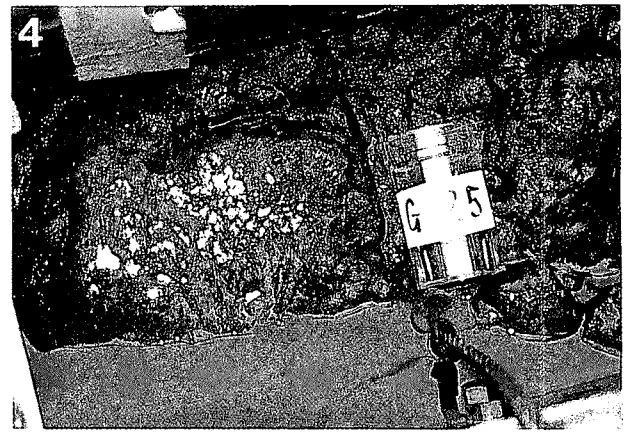
fig. 7. **Molluscan shell and shell fragments rich coarse- to very coarse-grained sand at the site G-17, 93 m deep.**

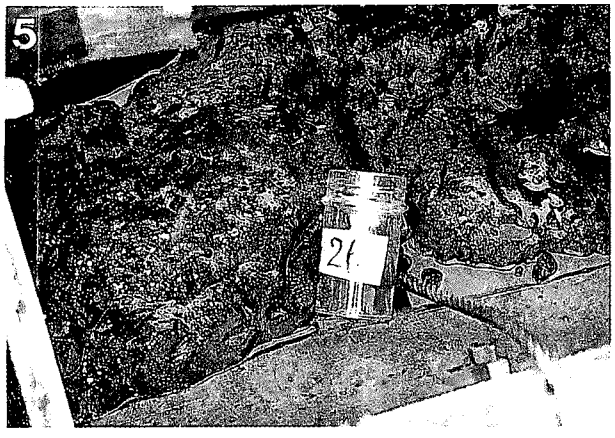
fig. 8. **Molluscan shell fragments rich coarse- to very coarse-grained sand at the site G-19, 65 m deep.**

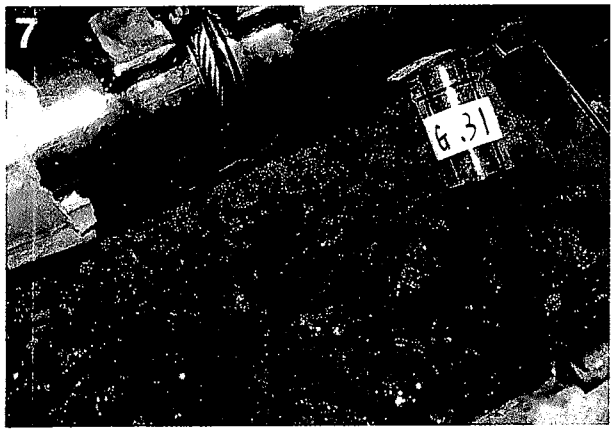
Plate 2











Explanation of Plate 2

Photographs of grab surface sediments around the Tsushima Islands in the southwestern marginal part of the Japan Sea immediate after the recovery (The sample bottle, 40 mm in diameter, gives scale).

fig. 1. Molluscan shell fragments bearing dark olive grey muddy fine-grained sand at the site G-20, 5 m deep.

fig. 2. Molluscan shell fragments bearing dark olive grey muddy very fine-grained sand at the site G-22, 124 m deep.

fig. 3. Molluscan shell fragments bearing dark olive grey sandy mud at the site G-24, 176 m deep.

fig. 4. Molluscan shell fragments bearing dark olive grey sandy mud or mud at the site G-25, 201 m deep.

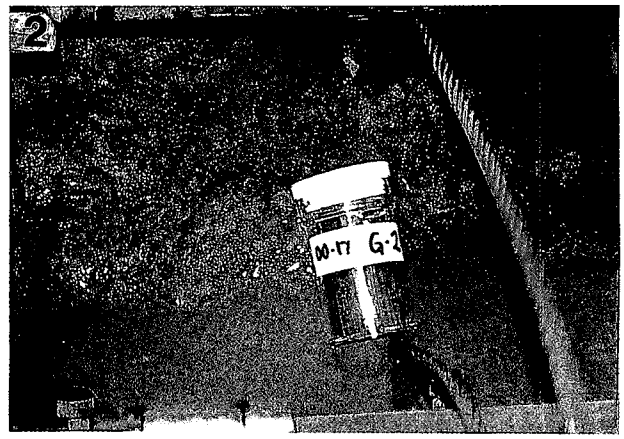
fig. 5. Molluscan shell fragments bearing dark olive grey sandy mud or mud at the site G-26, 254 m deep.

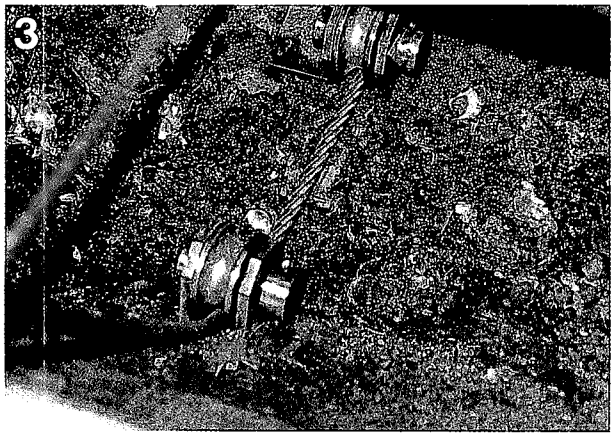
fig. 6. Moderate olive grey homogeneous mud covered by brownish grey soupy mud at the site G-28, 514 m deep.

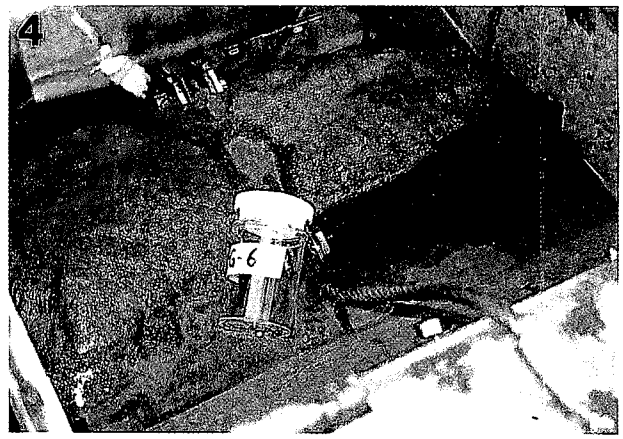
fig. 7. Moderate olive grey homogeneous mud covered by brownish grey soupy mud at the site G-31, 1,296 m deep.

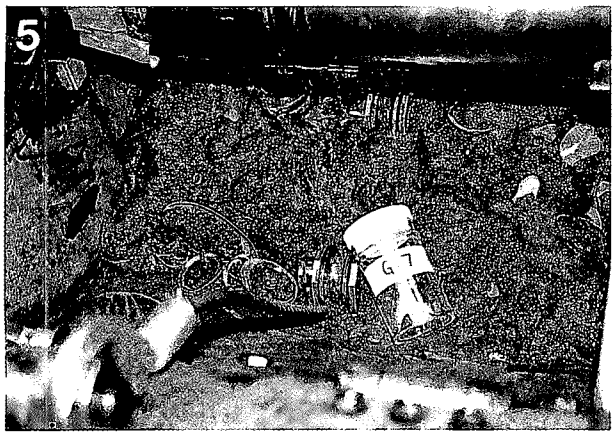
fig. 8. Moderate olive grey homogeneous mud covered by brownish grey soupy mud at the site G-32, 1,353 m deep.

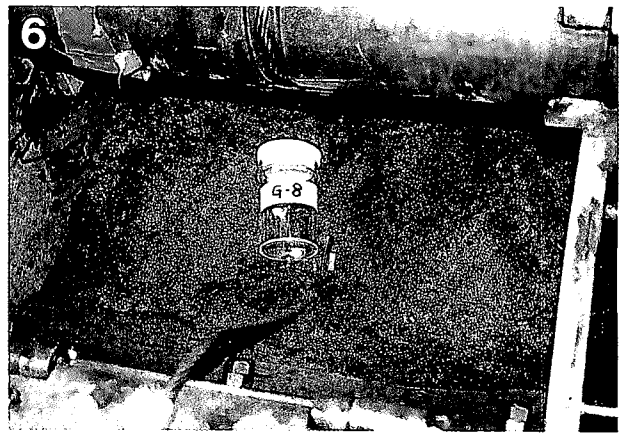
Plate 3

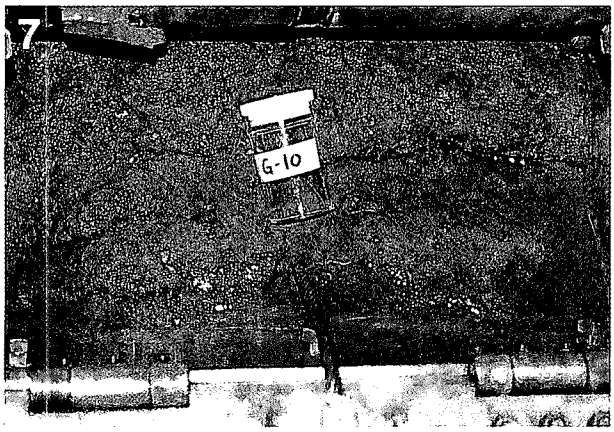


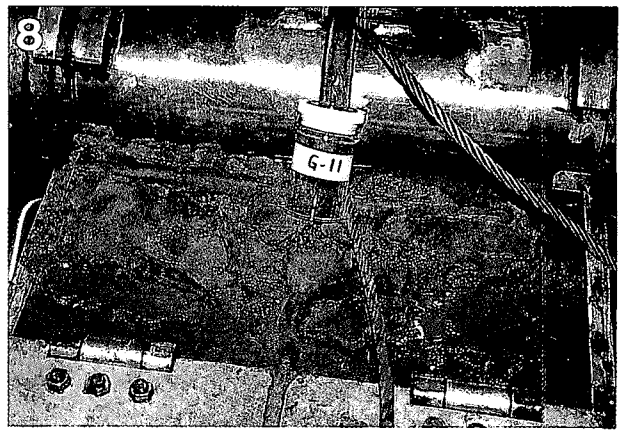












Explanation of Plate 3

Photographs of grab surface sediments southwest off Nagasaki in the northeastern marginal part of the East China Sea immediate after the recovery (The sample bottle, 40 mm in diameter gives scale).

fig. 1. Calcareous fragments bearing olive grey fine-grained sand covered by brown soft mud at the site G-1, 52 m deep.

fig. 2. Calcareous fragments bearing olive grey fine-grained sand covered by brown soft mud at the site G-2, 74 m deep.

fig. 3. Calcareous fragments rich dark grey fine-to medium grained sand at the site G-4, 125 m deep.

fig. 4. Calcareous fragments bearing yellowish grey fine-grained sand at the site G-6, 175 m deep.

fig. 5. Molluscan shell and shell fragments bearing dark olive grey fine-grained sand covered by pale yellow pumiceous sand at the site G-7, 203 m deep.

fig. 6. Calcareous fragments bearing dark olive grey fine-grained sand at the site G-8, 254 m deep.

fig. 7. Homogeneous olive grey muddy fine-grained sand covered by brownish yellow soupy mud at the site G-10, 502 m deep.

fig. 8. Homogeneous olive grey mud covered by reddish brown soupy mud at the site G-11, 800 m deep