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 MINISTRY OF AGRICULTURE, FISHERIES AND FOOD
 FISHERIES LABORATORY, LOWESTOFT, SUFFOLK, ENGLAND

1985 RESEARCH VESSEL PROGRAMME

REPORT: RV CLIONE : CRUISE 3

(PROVISIONAL: Not to be quoted without prior reference to the author)

STAFF:

M S Rolfe	
S Rowlett	25 February-3 March
D Limpenny	
H Rees	27 February-11 March
M M Parker	25-27 February
Debbie Chapman (UCL)	25-27 February
P A West	27 February-11 March
Nicola Shakspeare	25 February-3 March
P Hudson	3-11 March
C D Byrne	3-11 March
J E Thain	Landbased 3-7 March
T Fileman	Landbased 3-7 March

DURATION:

Left Lowestoft 1130 25 February
 Arrived Lowestoft 0015 11 March

LOCALITY:

North Sea

AIMS:

1. To collect suspended solids and water samples in the wake of sewage sludge dumping vessels in the Barrow Deep for chemical analysis.
2. To collect Modiolus and other epifauna off the Humber and elsewhere for biological, chemical and bacteriological analysis.
3. To collect sediments by grabbing and coring for physical, biological, microbiological and chemical analysis, as required, at various localities off the N E coast including (a) Tyne sewage sludge dumping ground and (b) Fly ash and colliery waste dumping grounds.
4. To investigate the dispersion of liquid industrial waste in the vicinity of the Tees dumping ground by water sampling and Aquatracka.
5. To investigate the dispersion of sewage sludge by various techniques off the Tyne by water sampling for bacteriological analysis and oyster embryo bioassay.
6. To conduct brief monitoring surveys over various dredged spoil dumping grounds off the N E coast and elsewhere using side-scanning sonar and grabbing.
7. To conduct side-scanning sonar surveys and associated grabbing and coring in the vicinity of (a) Roughs Tower and (b) Barrow Deep dumping grounds.
8. To deploy underwater Mark V camera and TV over dumping grounds off the N E coast, Humber and Barrow Deep.

9. To collect sediments by grabbing from widely spaced sites off the E and N E Coast for chemical and physical analysis.

(Additional aim)

10. To collect Pecten maximus from off Northumberland for PSP analysis.

NARRATIVE:

CLIONE left Lowestoft at 1130 25 February with Drs Parker, Rowlatt, Chapman, Messrs Rolfe, Limpenny and Miss Shakspeare aboard and proceeded to the Roughs Tower area where a side scanning sonar survey (Aim 7) was conducted from 1520 to 2239 the same day. On 26 and 27 February thick fog prevented the Thames Water Authority's sewage sludge vessels from dumping in the Barrow Deep disposal ground. In place of Aim 1, which had to be cancelled, various grab and plankton net stations were worked in the Barrow and Middle Deeps. In addition, sediments from a Tennant coring station in the Middle Deep enabled a series of acid volatile sulphide analyses to be carried out while at anchor overnight. The underwater television was also deployed while at anchor. Thicker fog on 27 February prevented any work and CLIONE steamed to the Cork Anchorage off Harwich where at 1630, Doctors Rees and West were brought to CLIONE by ORWELL SEARCHER and Doctors Parker and Chapman went ashore.

CLIONE then steamed to the Tyne area (Aim 2 being postponed until later in the cruise). Grabbing in the vicinity of the Tyne sewage sludge disposal ground (Tyne SSDG) was commenced at 1520 h, 28 February using a 0.1 m² Day grab (Aim 3a). A north-south transect of 26 stations was completed at 2248 h that evening. On 1 March (0857-1700 h) an east-west transect of 24 grab stations was worked, then on 2 March (0847-2009 h) a grid of 26 grab stations was completed in the same general area. In addition, a number of earlier stations were revisited for further samples both on 2 March and also on the morning of 3 March before CLIONE put into Hudson Dock, Sunderland at 1115 h where Miss Shakspeare and Dr Rowlatt disembarked and Messrs Byrne and Hudson came aboard.

CLIONE left Sunderland at 1143 h, 4 March. Five 2 m beam trawl stations were worked between 1254 and 1655 h along the north-south transect through the Tyne SSDG. Samples of dumped fly ash were then collected by grabbing (Aim 3b). On 5 March clean water samples were collected 15 miles north-east of Hartlepool before CLIONE anchored from the stern in the Tees industrial waste disposal ground (Tees IWDG). The dumping vessel YARROW commenced dumping in the vicinity at 1130 h and made 18 runs up-current of CLIONE at varying distances from the vessel (Aim 4). Water quality was monitored at a range of depths using two Aquatrackas and the Guildline package suspended in a profiling frame. Corresponding water samples were taken at various depths by both pump and bottle sampler. On completion of the station, the water samples were taken ashore by Z-boat at Hartlepool harbour for bioassay and chemical analysis. CLIONE then steamed to the Tyne SSDG where the underwater television and Mark V cameras were deployed between 2300 h 5 March and 0548 h 6 March. At 1201 h 6 March water quality monitoring and sampling was commenced in the sewage slick of the dumping vessel NORTHUMBRIAN WATER (Aim 5). This was achieved using the Aquatracka (sensing oil in the waste), a transmissometer and the Guildline package in the profiling frame. On completion at 1357 h, three Tennant coring stations were worked before CLIONE made for the Tyne anchorage from where the water samples were taken ashore to South Shields for analysis. CLIONE then steamed towards the Farne Islands where four tows were made with a set of three Newhaven scallop dredges on a Connolly roller (2115-2345 h) (Aim 10). En route and during the dredging a further series of acid volatile sulphide analyses were carried out on sections of a sediment core taken from the Tyne SSDG.

On 7 March CLIONE again rendezvoused with sewage sludge dumping vessel NORTHUMBRIAN WATER (at 1153 h, after a coring station at 0856 h). On this occasion the sensors used the previous day were towed repeatedly through the gradually dispersing slick in a modified HSTTN. On completion at 1830 h, three final coring stations were worked off the Tyne, then further clean water samples were collected 15 miles off Hartlepool (at 2204 h) and also an isolated grab station (Aim 9).

Five grab stations were worked over the Inner Tees spoil ground 0700-0800 h, 8 March (Aim 6) before CLIONE proceeded to the Tees IWDG to repeat the work carried out on 5 March. YARROW made a further 27 runs up-current of the stern-anchored CLIONE. On completion at 1832 h collected water samples were taken ashore by Z-boat and CLIONE steamed south at 2100 h.

On passage 17 grab stations were taken for Aim 9. Dredging for Modiolus commenced in the vicinity of the Spurn Head dumping ground at 0750 h 9 March using three Newhaven scallop dredges on a Connolly roller (Aim 2). Eight hauls were made at four sites. In addition the Mark V camera was deployed around slack water from CLIONE while drifting over the dumping ground. Two further dredge hauls were made in the Inner Dowsing area before CLIONE steamed eastwards at 2104 h. A final two dredge hauls were made 9 miles north of Blakeney, Norfolk on the morning of 10 March and the underwater television and Mark V camera, both attached to the same frame, were deployed in the area at slack water.

Further grab stations were worked periodically on passage back to Lowestoft. CLIONE anchored in Corton Roads at 1938 h before docking at 0015 h, 11 March.

RESULTS:

Apart from fog on the first two days, excellent weather prevailed during the cruise. (The one brief period of high winds occurred while CLIONE was docked at Sunderland). All the aims were achieved with exception of Aim 1 and 7 (b) in the Thames area (Figure 1). Aim 6 was not completed as extra time was allocated to Aim 5 in view of the optimum weather conditions and to Aim 3(a) because of its heightened priority.

Aim 1: Abandoned.

Aim 2: Good samples of Modiolus (also Echinus, Asterias and other species) were taken at the three selected areas. The Modiolus were cleansed in running seawater for 24 h before all were deep frozen. Results of on-board bacteriological analysis are not yet available.

Aim 3: The Tyne area was intensively sampled. Faecal coliformes and Group D faecal streptococci in sediments were estimated using both the 'Ayres' method of bacteriological analysis which relies on shaking samples by hand) and a new procedure involving ultrasonication of sediments to release particulate-bound bacteria prior to culturing. Data presented in figures 2a and b illustrate the superiority of the new procedure for detecting the zone of recent sewage settlement. Similar results were obtained for the faecal streptococci. Bacteriological examination of sectioned sediment cores indicated that faecal bacteria penetrate to a depth of 3 cm. These observations will be used in conjunction with benthic and chemical analysis to see if the theory that benthos can assist in the transport of sewage sludge through the sediments is tenable

Two samples were taken from the fly ash dumping ground. Sampling of the colliery waste dumping areas was not conducted specifically but a number of samples were taken during Aim 3(a).

Aim 4: The two very successful days provided a large number of measurements of dispersion of the industrial waste. Shore analyses are not yet available.

Aim 5: Both transmissometry and UV fluorescence proved successful techniques for tracking sewage sludge. On the second occasion the slick was followed at various depths for more than five hours. Results of bacteriological analyses will be assessed when the results of the bioassay and chemical analyses carried out ashore are available.

Aim 6: The only work attributable to this aim was the five grab stations on the Inner Tees spoil ground. However, several spoil grounds off the N E coast were sampled by grabbing during Aim 3(a).

Aim 7: The side scanning sonar survey over the Roughs Tower dumping ground successfully revealed dumped spoil and other features. Unfortunately time and weather conditions early in the cruise did not permit the collection of any ground truth samples.

Aim 8: Results from the Mark V camera deployed in the Tyne and Humber areas and north of Blakeney await film development. Underwater television was not successful in the Thames estuary due to excessive suspended sediments, nor off Blakeney because of a lamp failure but successful over the Tyne SSDG, where, it is thought, materials derived from sewage dumping could be detected.

Aim 9: Sediments were obtained from 12 of the 17 grab stations worked between the Tees and Lowestoft.

Aim 10: A sample of scallops was obtained and deep frozen for PSP analysis. All additional scallops were deep frozen for Dr Dare (FSM3).

M S Rolfe
15 March 1985

SEEN IN DRAFT:

G S

R C N

INITIALLED:

H W H

DISTRIBUTION:

Basic List +

M S Rolfe

S Rowlatt

D Limpenny

H Rees

M M Parker

Debbie Chapman

P A West

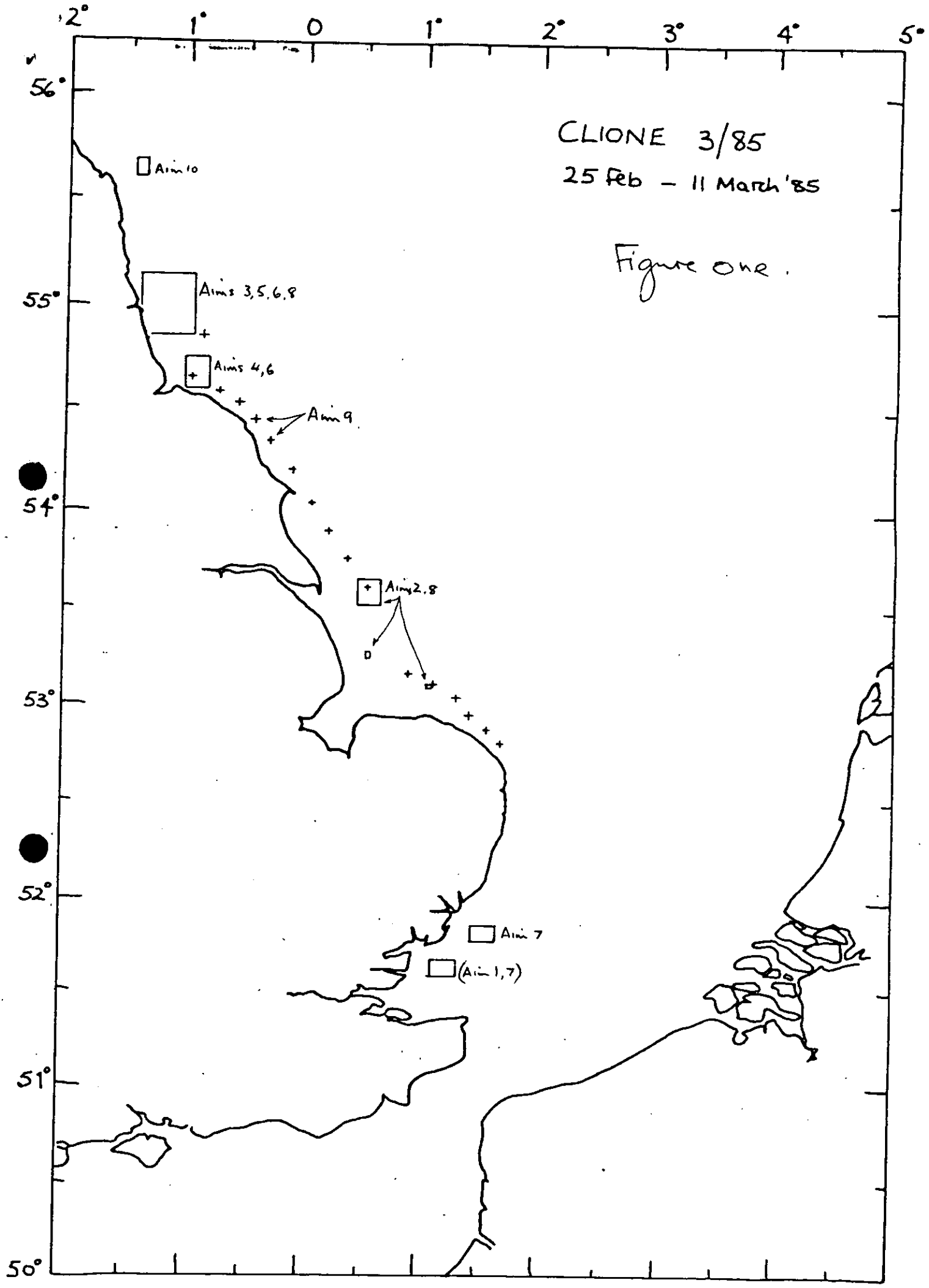
Nicola Shakspeare

P Hudson

C D Byrne

J E Thain

T Fileman



CLIONE 3/85
25 Feb - 11 March '85

Figure one.

□ Aims 10

□ Aims 3, 5, 6, 8

□ Aims 4, 6

Aims 9

□ Aims 2, 8

□ Aims 7

□ (Aims 1, 7)

Scale

• = < 1/g

/// = 1-10/g

•••• = 10-49/g

■ = > 50/g

1 naut. mile

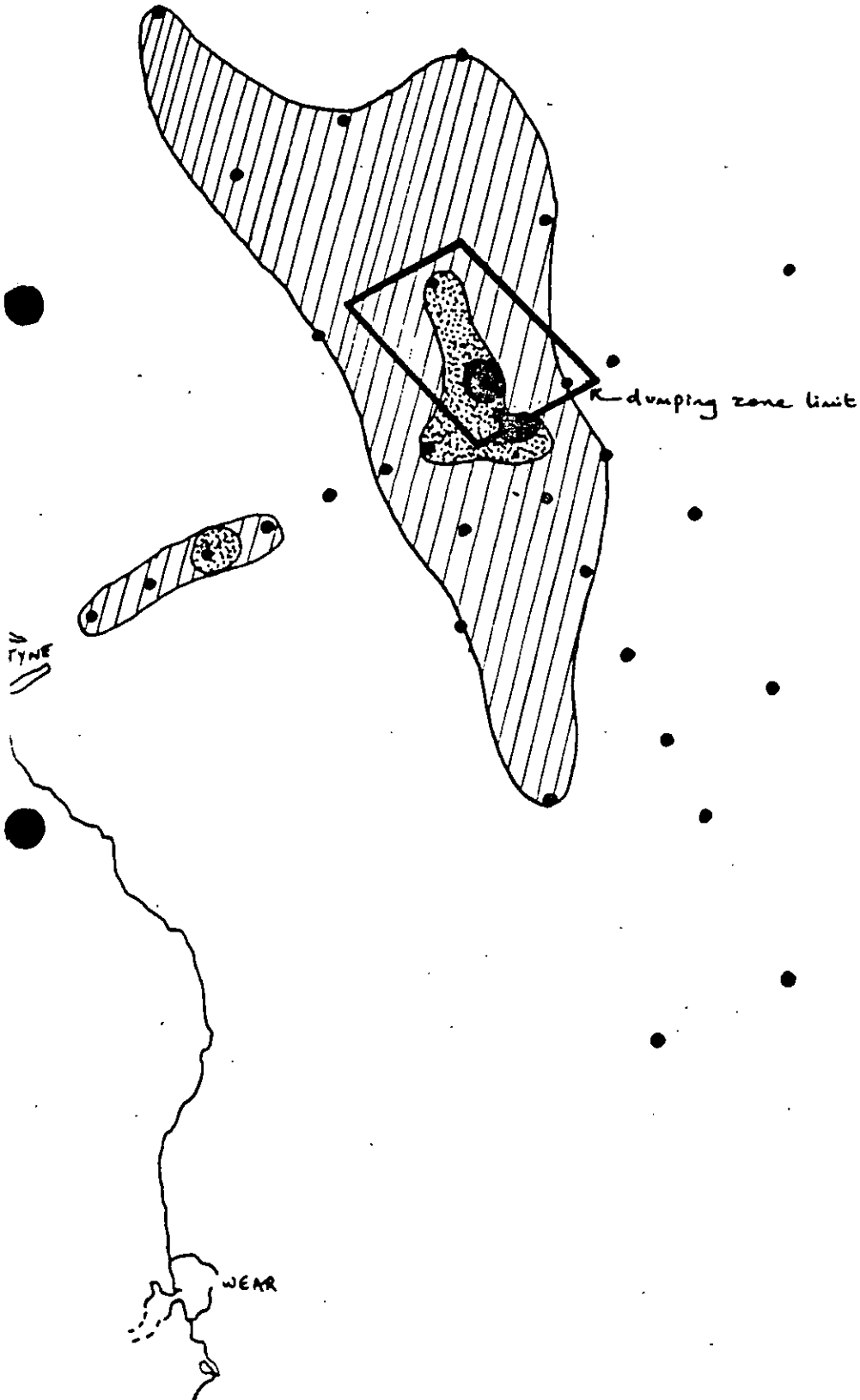


Figure 2A
Escherichia coli /g
Sediment by
Ayres method

Ch. D.W.
9/3/65

Scale

- = <1/g
- /// = 1-10/g
- ▒ = 10-99/g
- = >50/g

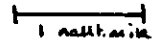
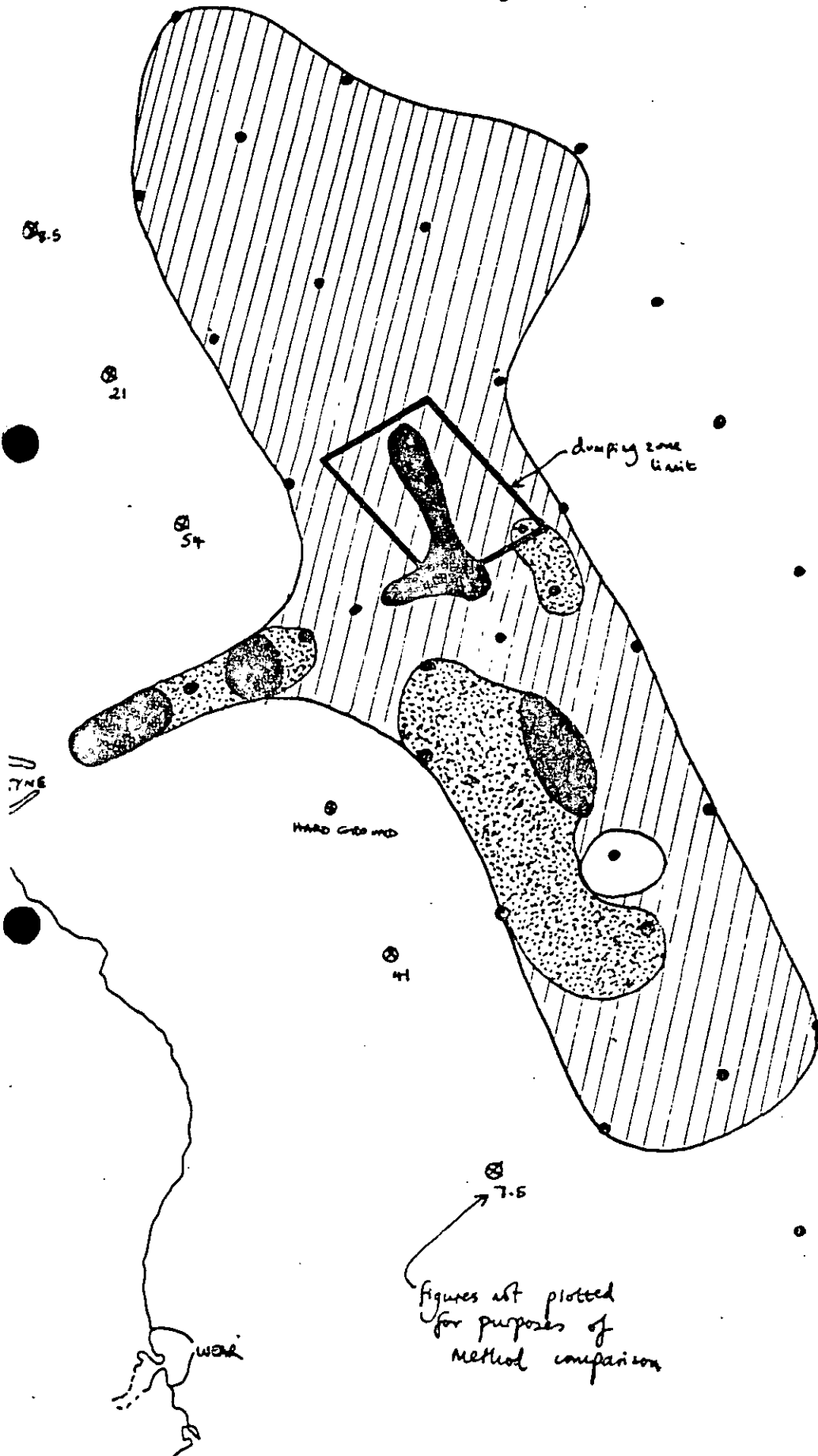
1 millim. 

Figure 2B
Escherichia coli/g
Sediment by
ultrasonication method



P. AW.
9/3/65