## The hydrography and plankton of the eastern English Channel in March 1976

(Figures 76–78; Tables 20–22)

During a cruise of RV "Sarsia" from 9 to 23 March 1976 (Fig. 76a), surface water temperature, salinity, and chlorophyll *a* fluorescence were recorded continuously while the ship was underway. Discrete water samples were taken for analyses of inorganic nutrients (Fig. 76b), for measurements of chlorophyll *a*, phaeopigment and carbon fixation, and for phytoplankton cell counts (for methods see *J. mar. biol. Ass. U.K.*, 56: 845, and 57: 1075–1093). Zooplankton samples were also collected by oblique or (in water <25 m deep) horizontal tows at ~4 knots of 30 cm Lowestoft samplers that were fitted with 270 µm mesh nets.

Relatively warm, high salinity water extended up the centre of the English Channel into the Southern Bight (Fig. 77a, b). Areas adjacent to major river estuaries were characterized by high levels of inorganic nutrients (Fig. 78a–c), as well as lower salinities. Throughout the whole region the water column was well mixed with respect to both temperature and salinity.

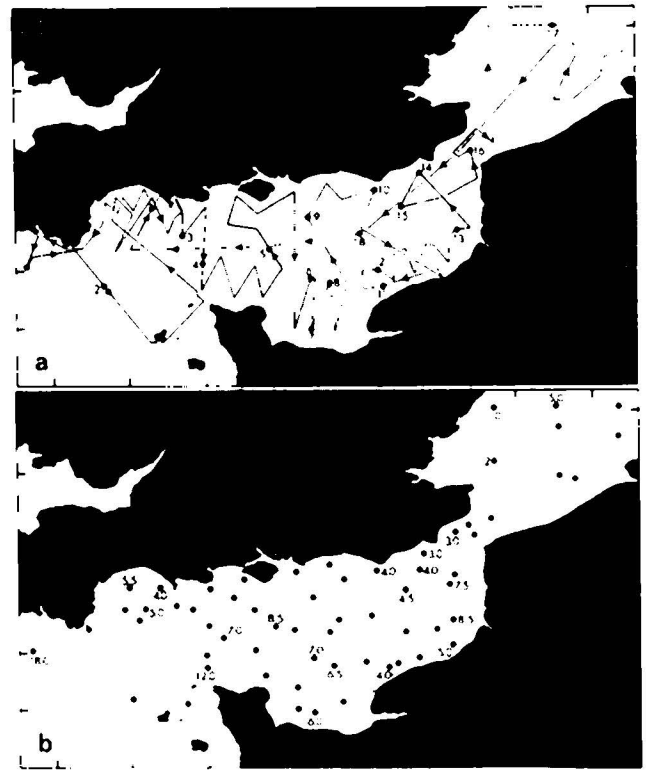


Figure 76. (a) Track of RV "Sarsia", 9–23 March 1976, showing station positions for plankton samples. Most of the data were obtained after 14 March when the ship departed from Weymouth (We) following delays caused by poor weather. (b) Positions for inorganic nutrient samples, and Secchi disc values (m).

**Table 20. Data on phytoplankton pigment concentrations, carbon fixation under light saturation (*P*max), and cell counts**

| Station number (see Fig. 76a) | 6 | 7 | 11 | 13 | 14 | 16 | 19 |
|---|---|---|---|---|---|---|---|
| Chlorophyll *a* (mg m$^{-3}$) | 0·5 | 2·8 | 6·5 | 2·1 | 0·6 | 0·4 | 0·6 |
| Phaeopigment (mg m$^{-3}$) | 0·8 | 1·0 | 4·5 | 2·8 | 0·3 | 0·4 | 0·2 |
| *P*max (mgC m$^{-3}$ h) | 2·0 | 29·4 | 68·1 | 20·3 | 1·7 | 2·4 | 1·9 |
| Assimilation number (mgC mgChla$^{-1}$ h) | 4·0 | 10·5 | 10·8 | 9·7 | 2·8 | 6·0 | 3·2 |
| Cell counts (thousands l) | | | | | | | |
| *Chaetoceros debile* | — | 15·0 | 75·0 | — | — | • | — |
| *Chaetoceros* spp. (small) | — | 37·5 | 37·5 | — | — | — | — |
| *Fragilaria* sp. | 1·0 | 1·3 | — | — | 2·1 | •• | •• |
| *Lauderia borealis* | • | 1·5 | 1·8 | — | •• | •• | |
| *Nitzschia closterium* | 1·1 | 9·0 | •• | — | •• | •• | • |
| *Paralia sulcata* | •• | •• | 1·9 | — | •• | •• | •• |
| *Skeletonema costatum* | — | • | 62·0 | — | — | — | •• |
| *Thalassionema nitzschioides* | •• | 2·5 | 6·0 | — | •• | •• | •• |
| *Thalassiosira rotula* | •• | 98·0 | 128·0 | — | •• | •• | •• |
| *Thalassiosira* sp. 1 | •• | 2·0 | 1·2 | — | — | — | — |
| *Thalassiosira* sp. 2 | — | 14·5 | 32·0 | — | — | — | — |
| Total diatoms | 5·7(21) | 183·8(25) | 348·6(28) | — | 3·4(15) | 3·6(17) | 2·4(14) |
| Dinoflagellates | ••(6) | ••(5) | ••(7) | — | — | •(2) | — |
| Flagellates | 870 | 680 | 616 | — | 504 | 744 | 504 |

• = 1–99 cells l$^{-1}$, •• = 100–999 cells l$^{-1}$

Numbers of diatom and dinoflagellate species are shown in parentheses.

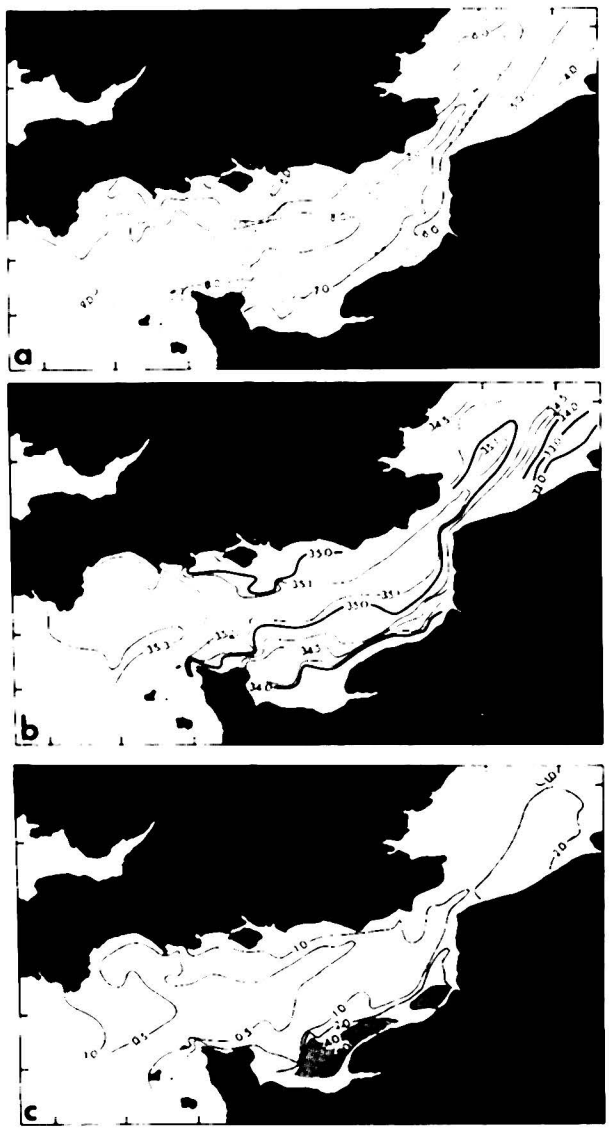

Figure 77. (a) Surface temperature (°C). (b) Surface salinity (‰). (c) Surface chlorophyll *a* (mg/m³).

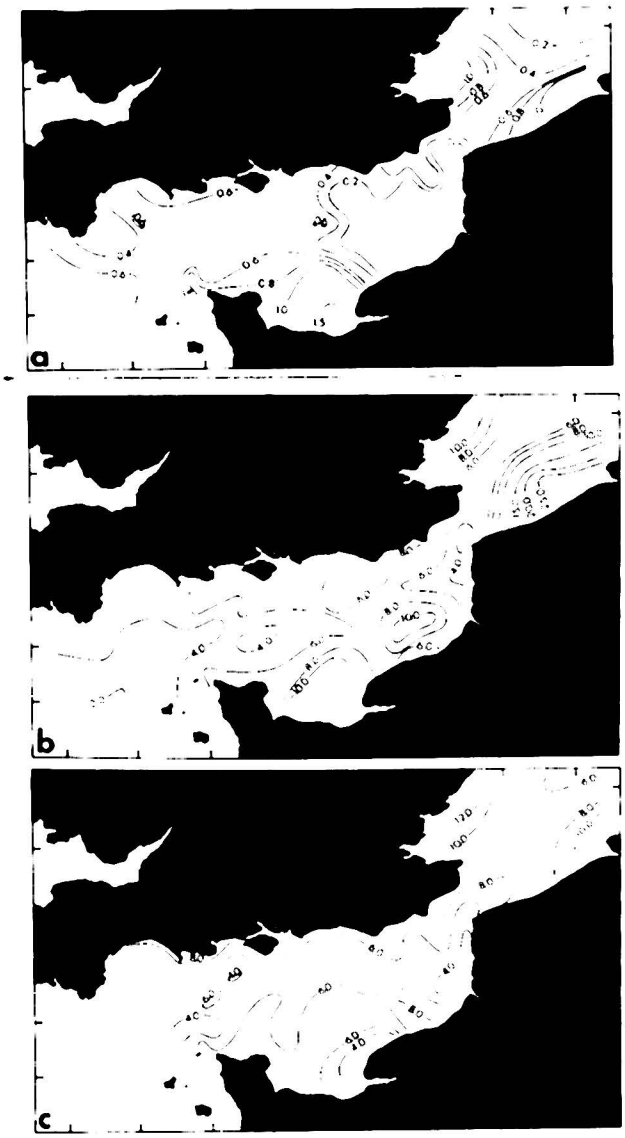

Figure 78. The distributions of inorganic nutrients (µgat/l). (a) Inorganic phosphate - P. (b) Nitrate - N. (c) Silicate - Si.

Along the coast of France, and to a lesser extent off the Belgian coast, the spring phytoplankton outburst was well developed (Fig. 77c). Although some correlation between the distributions of chlorophyll *a* and salinity is apparent, rapid plant production in these regions was probably due to favourable conditions of illumination. On the English side of the Channel the water was more turbid (Fig. 76b) and is somewhat deeper. High assimilation numbers (Table 20) indicate that phytoplankton growth was not nutrient limited even at station 13, where the concentration of inorganic phosphate was <0·2 µgat/l.

The dense phytoplankton populations were dominated by diatoms (Table 20), and the species composition at stations 7 and 11 was very similar apart from a much greater abundance of *Skeletonema costatum* at station 11. Elsewhere relatively few diatoms were recorded, and small flagellates probably accounted for

**Table 21. Analyses of zooplankton samples from stations 1–19 (see Fig. 76a)**

Numbers/m³

| Station number | Water depth (m) | Volume of filtered water (m³) | Polychaete larvae | Copepods (post-naupliar) | Cirripede nauplii | Cirripede cypris | Brachyuran larvae | Gastropod larvae | Chaetognaths | Larvacea | Fish eggs | Fish larvae | Total organisms |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 70 | 42 | 2 | 272 | -- | — | 17 | — | • | 24 | 8 | 2 | 327 |
| 2 | 70 | 26 | 2 | 217 | -- | — | 10 | — | • | 5 | 5 | 2 | 253 |
| 3 | 55 | 46 | • | 127 | — | — | 14 | — | • | 6 | 5 | • | 156 |
| 4 | 60 | 46 | • | 272 | — | — | 55 | — | • | 2 | 1 | 2 | 316 |
| 5 | 65 | 44 | — | 67 | 34 | — | 19 | — | • | 1 | 2 | • | 132 |
| 6 | 50 | 57 | • | 47 | 111 | — | 7 | • | • | 7 | 2 | • | 186 |
| 7 | 20 | 51 | 83 | 367 | 1508 | 45 | 2 | — | • | 8 | 2 | • | 2017 |
| 8 | 45 | 39 | 3 | 202 | 50 | — | 12 | 21 | 2 | 6 | 15 | • | 317 |
| 9 | 60 | 54 | 1 | 51 | 38 | — | 8 | 6 | • | • | 1 | • | 111 |
| 10 | 20 | 43 | • | 144 | • | — | 17 | • | 3 | • | 7 | • | 176 |
| 11 | 25 | 40 | 97 | 365 | 428 | 15 | • | • | • | 9 | 2 | • | 921 |
| 12 | 35 | 48 | 3 | 248 | 6 | • | 10 | 4 | 2 | 6 | 1 | • | 284 |
| 13 | 15 | 35 | 45 | 1501 | 103 | 3 | 25 | 4 | 4 | 192 | 6 | 9 | 1932 |
| 14 | 30 | 36 | • | 87 | • | — | 6 | • | • | • | • | • | 97 |
| 15 | 45 | 45 | 4 | 52 | 21 | • | 12 | 2 | • | • | 2 | • | 97 |
| 16 | 45 | 47 | 1 | 449 | 6 | — | 5 | • | • | 37 | 9 | 2 | 513 |
| 17 | 40 | 42 | 4 | 391 | 175 | • | 16 | — | 4 | 17 | 6 | 23 | 645 |
| 18 | 45 | 51 | 22 | 153 | 180 | — | 8 | 10 | • | • | 4 | 1 | 380 |
| 19 | 40 | 45 | 1 | 261 | 3 | — | 66 | • | 2 | 9 | 7 | • | 357 |

• = <1 individual/m³

**Table 22. Relative abundance of fish larvae**

| Station number (see Fig. 76a) | 1 | 2 | 4 | 13 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|
| Clupeoids[1] | • | • | — | • | •• | • | • |
| *Trisopterus luscus* | — | • | •• | — | • | — | • |
| *T. minutus* | •• | •• | • | — | — | — | — |
| Rockling | — | — | • | • | • | — | • |
| *Ammodytes marinus* | • | • | — | • | ••• | ••• | • |
| *Callionymus* sp. | •• | ••• | ••• | • | • | — | • |
| *Limanda limanda* | • | • | • | • | — | — | • |
| *Platichthys flesus* | — | — | — | ••• | • | — | — |
| Other species | • | — | • | • | • | — | •• |
| Indeterminate | — | — | • | — | — | • | • |
| n | 47 | 39 | 53 | 65 | 60 | 117 | 37 |

• = <20%; •• = 20–50%; ••• = >50%.
[1] Mainly *Sprattus sprattus*.

the major part of the chlorophyll content of the water as well as photosynthetic carbon fixation. In all samples the numbers of dinoflagellates were very low.

Data on the abundance of the major zooplankton taxa are given in Table 21. Greater concentrations of herbivores were found in chlorophyll-rich water at stations 7, 11, and 13, together with high values for phaeopigments (see Table 20). The only other station at which the phaeopigment concentration exceeded 1·0 mg/m³ was 17, where levels of chlorophyll *a* and phaeopigment were 0·5 and 2·5 mg/m³, respectively. These indicate that in parts of the Southern Bight the standing crop of phytoplankton had already been largely depleted by grazing. The chaetognaths were all *Sagitta setosa*, apart from single specimens of *S. elegans* in samples from stations 3 and 17.

Larval fish from samples estimated to contain >50 individuals were examined by Sir Frederick Russell (Table 22). The western stations were characterized by gadoids and *Callionymus*, whereas the more dense populations at stations 13 and 17 were dominated respectively by *Platichthys flesus* (72%) and recently hatched *Ammodytes marinus* (95%).

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