

obelisk and a model of a sailing ship recently erected by schoolchildren from Tiksi. I should not like to disappoint the children of Tiksi, but Commander De Long is not buried in the Lena delta; or more correctly he was, but is no longer.

Commander De Long and 9 other members of the *Jeannette* expedition were indeed buried at Skala Kyuyegel'khaya by George W. Melville, *Jeannette's* engineer, in early April 1882. Indeed Melville went to a great deal of trouble to produce an enduring grave and monument for his former shipmates; the cross he erected over the grave was 22 ft [6.1 m] high and 13 in [0.3 m] in diameter! But a year later, in early March 1883, Lieutenant Giles B. Harber, USN, while in the Lena delta searching for further missing men from *Jeannette*, disinterred the bodies on orders from Washington. In a quite remarkable feat of logistics they were transported by sledge to the railhead at Orenburg in the southern Ural mountains, a distance of some 4 000 km, arriving there on 16 January 1884. The bodies had been stored in the permafrost at Yakutsk over the summer. On the sledge trip from Yakutsk to Orenburg the bodies were greeted with much fanfare and ceremony at such cities as Irkutsk, Tomsk and Omsk, where the coffins were put on display in temporary catafalques, accompanied by military guards of honour and public addresses. Having been transferred to sealed metal coffins, the bodies left Orenburg in a special railway carriage on 24 January and travelled via Samara, Moscow and Berlin to Hamburg. They were put aboard the Hamburg American Packet Company's steamer, *Frisia*, which sailed on 6 February 1884 for New York. After her arrival on the 20th the coffins were taken in what was almost a state funeral procession to the Brooklyn naval yard. Next day, in an equally impressive procession, they were taken to the Church of the Holy Trinity at the junction of Forty-second Street and Madison Avenue. After the service a special train carried the funeral party to Woodlawn Cemetery. Here is where Commander De Long is buried. I hope that the schoolchildren of Tiksi will forgive me, but these are the facts.

Yours sincerely
WILLIAM BARR

24 November 1981

Review

ARCTIC OCEAN ATLAS

[Review by Terence Armstrong and Vernon Squire* of *Atlas okeanov. Severnyy ledovityy okean [Atlas of the oceans. Arctic Ocean]* edited by V. I. Faleyev and others. Moscow, Ministerstvo Oborony SSSR. Voyenno-Morskoy Flot, 1980, xii, 184, 5p. Hardcover. 25 roubles.]

The Soviet Ministry of Defence has produced a third atlas in its series covering the oceans of the world: the Arctic Ocean. It is, like its predecessors, a magnificently produced volume which conforms to the highest standards of cartographic printing. An edition of 15 000 copies has been printed, and, selling at 25 roubles, it represents remarkable value.

The main sections of the atlas are history of exploration, ocean floor, climate, hydrology, hydrochemistry, biogeography, and a miscellaneous section called reference maps. Each section has a short introductory text which summarizes the information shown in the maps and indicates the limiting dates of the data recorded and, in general terms, the sources. The data were assembled by at least eight institutions, including the atlas's own editorial office, but the lion's share of the work seems to have been done by the Arctic and Antarctic Research Institute [Arkticheskiy i Antarkticheskiy

* Scott Polar Research Institute, University of Cambridge, Lensfield Road, Cambridge CB2 1ER.

Nauchno-Issledovatel'skiy Institut], which prepared 416 out of the 586 maps. There is an index which includes subjects as well as proper names (rare in a Soviet book), and the legend common to most of the maps is provided also on a loose sheet for easy use.

The base maps on which the different distributions are shown are of course standard. Most are at 1:15 million (double page), 1:30 million (half page), or 1:45 million (quarter page), but a few inset maps are at larger scales. All projections are azimuthal. In general the Arctic Ocean is interpreted broadly, as including adjacent seas of the Atlantic and Pacific. But since the North Pole is not in the centre of the Arctic Ocean, there is sometimes a slightly annoying cut-off on the North Pacific side. The only poor map is a loose-leaf sheet of the world at 1:25 million, showing world ocean bathymetry in a not very satisfactory way.

The history of exploration section is arranged primarily on a chronological basis, from earliest times to 1979. The period covered by each sheet diminishes as the terminal date is reached and the volume of information increases, with the last three sheets covering 20 years or less each. Fine colour printing achieves exemplary clarity of presentation, for instance of the multiple tracks of the Russian Great Northern Expedition of 1733–43, and of the Soviet oceanographic voyages between the wars. Similarly the sheets covering 1946–60 and 1961–79 show between them the tracks of all the drifting stations that have functioned in the Arctic Ocean (not easily found elsewhere). One may quarrel with some of the detail shown here: Svalbard is said to have been known to Russians in the 15th–16th centuries, but there is no solid evidence even for the later of these dates; Chirikov in 1741 is credited with describing the coasts of the whole archipelago of south-east Alaska, whereas he sailed only along the seaward side of its northern part. But these and similar points are small errors compared with the mass of good information.

The ocean floor section contains a general relief map showing contours at 50, 100, 200 and 1 000 m, and thence at 1 000 m intervals (a simplified version of this might have been helpful as an underlay to many of the later distribution maps). Care must be taken over discrepancy in names of bottom features between Soviet and American usage. Other maps show types of relief, volcanoes, tectonics, geomorphology, shore types and bottom deposits.

Climate is the largest section, with 224 maps. It includes monthly maps for thermal regime and for surface winds, and maps for four selected months for precipitation and for upper air winds. The hydrology section covers not only water structure and dynamics but also sea ice. Maps show currents on the surface and at depths of 100, 300, 500 and 1 000 m. One might offer the criticism here that for the Arctic Ocean, which is dominated by surface regimes, it would have been useful to show what happens between the surface and 100 m depth. The sea ice section has 20 maps showing resultant drift (ie, distance made good) by quarterly periods, and extent of ice cover (maximum, minimum, mean) by monthly periods. There is also a presentation of the break-up pattern for fast ice, on the Eurasian side only. Useful though this information is, it must represent only a tiny fraction of the data recorded over the last three decades. Age and thickness data, for instance, would have been most helpful, even if they were available only in areas studied by Soviet investigators.

The hydrochemistry section is relatively small, and presents data on distribution of dissolved oxygen, pH, phosphates, and silicic acid at selected depths. Biogeography records plankton, benthos, and certain molluscs, fish, birds and sea mammals. The reference maps include distributions of geomagnetic forces, aurora, and light and darkness.

Detailed information on the sources of all the data is not provided (it seldom is in compilations of this kind). One must assume that the Soviet drifting stations, and the biannual high latitude air expeditions which complement their work, have provided a great deal, even though most of their observations are not published. This is most useful. There is, however, a bias in favour of displaying Soviet data. In the case of surface oceanographic data, especially salinity, the contours on the Soviet side are much closer spaced than on the US side. This can be misleading, with polar fronts glossed over and the Bering Slope Current, for instance, hardly existing. It is quite evident that neither the *Oceanographic atlas of the Bering Sea basin* by Sayles, Aagaard, and Coachman (Seattle, 1979), nor the published data on which it is based, were used at all. Likewise the atlas under review shows a mean southerly drift through the eastern half of Bering Strait—a flow which American scientists claim is unsupported by any US data. All this means that this atlas needs to be used in conjunction with an American one. This is a pity, for while the whole work, of compilation, presentation and production, reflects great credit on all concerned, the atlas falls short of being a research tool which sweeps aside all competitors.