

DET KGL. NORSKE VIDENSKABERS SELSKAB
MUSEET

MISCELLANEA

23



Jon-Arne Snøli

THE DISTRIBUTION OF CAUDOFOVEATA, POLYPLACOPHORA, AND
PROSOBRANCHIA IN BORGENTJORDEN, NORTH-TRØNDELAG, NORWAY

TRONDHEIM 1975

EDITORIAL BOARD

Konservator Fredrik Gaustad
Amanuensis Asbjørn Moen
Førstebibliotekar Bo Harald Nissen
Amanuensis Jon-Arne Sneli

INFORMATION FOR CONTRIBUTORS

"Det Kgl. Norske Videnskabers Selskab, Muséet, Miscellanea," will mainly present original papers within the area of work and responsibility covered by The Royal Norwegian Society of Sciences and Letters, the Museum, — i.e. archaeology, cultural history, botany and zoology. The series is printed in offset.

LANGUAGE

Contributions are accepted in English and Norwegian or exceptionally in other languages.

MANUSCRIPTS

Authors should submit the original manuscripts to the editorial board and the authors are requested to retain one complete and corrected copy.

Manuscripts should be typed double-spaced on one side of the paper, with top and left-hand margins at least 3 cm wide.

Separate sheets should be used for the following:

- 1) title pages, with the authors name and institution,
- 2) an abstract in English not exceeding 200 words;
- 3) a summary not exceeding 3% of the original manuscript;
- 4) references;
- 5) Tables with their headings;
- 6) legends to Figures.

In case of papers submitted in a language other than English, the title page, summary, table headings and figure legends must also be translated into English.

ILLUSTRATIONS

All illustrations and diagrams other than Plates are to be considered as Figures. Line drawings should be drawn with black Indian ink, in size allowing for reductions. Photographs should be unmounted glossy enlargements showing details. The authors name and number of the figure should be written on the back of each.

REFERENCES should be quoted in the text as Brown (1957), Brown & White (1961) or if more than two authors, Green et al. (1963). Multiple references should be given as "Several authors have reported (Brown 1957, Brown & White 1961, Green et al. 1963)," i.e. in chronological order, no comma between name and year.

Lists of references are to be unnumbered and in alphabetical order. The international alphabetical order of Scandinavian and German vowels is: Å = AA, Æ and Ä = AE, Ø and Ö = OE, Ü = UE. Indicate 1st, 2nd, 3rd, etc. works by the same author in the same year by a, b, c, etc. (White 1966a). Titles of journals should generally be abbreviated according to the last edition of World List of Scientific Periodicals.

Examples:

Brøgger, A. W. 1925. *Det norske folk i oldtiden*. Oslo.

Gjærevoll, O. 1963. Survival of plant on nunataks in Norway during the pleistocene glaciation. pp. 261–283 in A. & D. Löve (ed.), *North Atlantic Biota and Their History*. Oxford.

Sivertsen, E. 1935. Über die chemische Zusammensetzung von Robbenmilch. *Nytt Mag. Naturvid.* 75: 183–185.

PROOFS

The author will receive one copy of the offset plates, which should be carefully corrected and returned within the specified time. Due to the printing method the author can be charged for alterations.

OFFPRINTS

Authors will receive 100 offprints gratis. Additional copies can be ordered when the proofs are returned.

CORRESPONDENCE concerning manuscripts, offprints, subscription and other editorial matters should be adressed to: Universitetet i Trondheim, Det Kongelige Norske Videnskabers Selskab, Museet, Miscellanea, Erling Skakkes gt. 47 b, N-7000 Trondheim.

K. norske Vidensk. Selsk. Mus. Miscnea 23 - 1975

Contribution No. 187. Biological Station, Trondheim, Norway

THE DISTRIBUTION OF CAUDOFOVEATA, POLYPLACOPHORA, AND
PROSOBRANCHIA IN BORGENTJORDEN, NORTH-TRØNDELAG, NORWAY

by

Jon-Arne Snøli

University of Trondheim
The Royal Norwegian Society of Sciences and Letters, The Museum

ISBN 82-7126-063-4

ABSTRACT

Sneli, Jon-Arne. 1975. The distribution of Caudofoveata, Polyplacophora, and Prosobranchia in Borgenfjorden, North-Trøndelag, Norway. *K. norske Vidensk. Selsk. Mus. Miscnea* (23): 1-26.

The species distribution was investigated by grab sampling with a 0.1 m² Petersen grab (1,039 samples) during the years 1967-1971. A total of 1,195 specimens, belonging to 29 species, were obtained. The most abundant species on soft bottom substrates in Borgenfjorden were *Turritella communis* and *Aporrhais pespelecani*, comprising altogether 92.5% of all the specimens collected. About 40% of the species sampled are typical epifaunal organisms. In all three groups lusitanian-boreal species dominated within both fjord basins. Local distribution maps are presented.

Jon-Arne Sneli, Biological Station, N-7001 Trondheim, Norway.

CONTENTS

INTRODUCTION	7
AREA AND ENVIRONMENT	7
MATERIAL AND METHODS	10
RESULTS	11
Caudofoveata	12
Polyplacophora	12
Prosobranchia	14
DISCUSSION	21
ACKNOWLEDGEMENTS	24
REFERENCES	26
MAPS	

INTRODUCTION

The first inventories of the algae, benthic invertebrates, fishes and mammals in Borgenfjorden were made about half a century ago (Nordgaard 1910, 1923). The fjord once harboured a large stock of plaice (*Pleuronectes platessa* L.), but the size of the stock decreased considerably after 1940-1945. An extensive biological survey, to study the ecological relationships in the fjord, and if possible, to find reasons for the decrease in the stock of plaice was therefore started in 1967 (see Borgenfjordundersökelsene 1969, 1970, 1971, 1973).

The Borgenfjord survey includes investigations of the bottom fauna (Gulliksen, 1971, 1972, 1974, Holthe 1973, E. Lande 1975, E. Lande & Gulliksen 1973, Skjæveland 1972, 1973), sediments (Strömngren 1974, Strömngren et al. 1971), hydrodynamics (McClimans 1973), food and feeding habits of cod (Denstadli 1972) and plaice (R. Lande 1972, 1973).

This paper deals with the Caudofoveata, Polyplacophora, and Prosobranchia sampled in Borgenfjorden during the period 1967-1971.

AREA AND ENVIRONMENT

Borgenfjorden is located in the inner part of Trondheimsfjorden (Fig. 1). It is connected with Trondheimsfjorden proper by a narrow inlet, Strømmen, approximately 5-6 m deep and 150 m wide. The fjord itself is divided into two basins by a threshold, at a depth of 14 m. The maximum depth of the outer (southern) basin is nearly 40 m, of the inner (northern) about 30 m (cf. Fig. 3). The surface area of the fjord, at the high water mark, is estimated to be ca. 19.3 km².

Based on SCUBA-diving forays and from the contents of dredges and grabs, Gulliksen (1971) has described the main types of bottom substrate; sediment analyses of subsamples from 85 grab samples have been published by Strömngren et al. (1971). The finest sediment types are found in the northern basin (Fig. 2). Coarser sediments occur where the tidal current has its greatest influence, i.e. near the entrance to the fjord, in areas situated on the west side

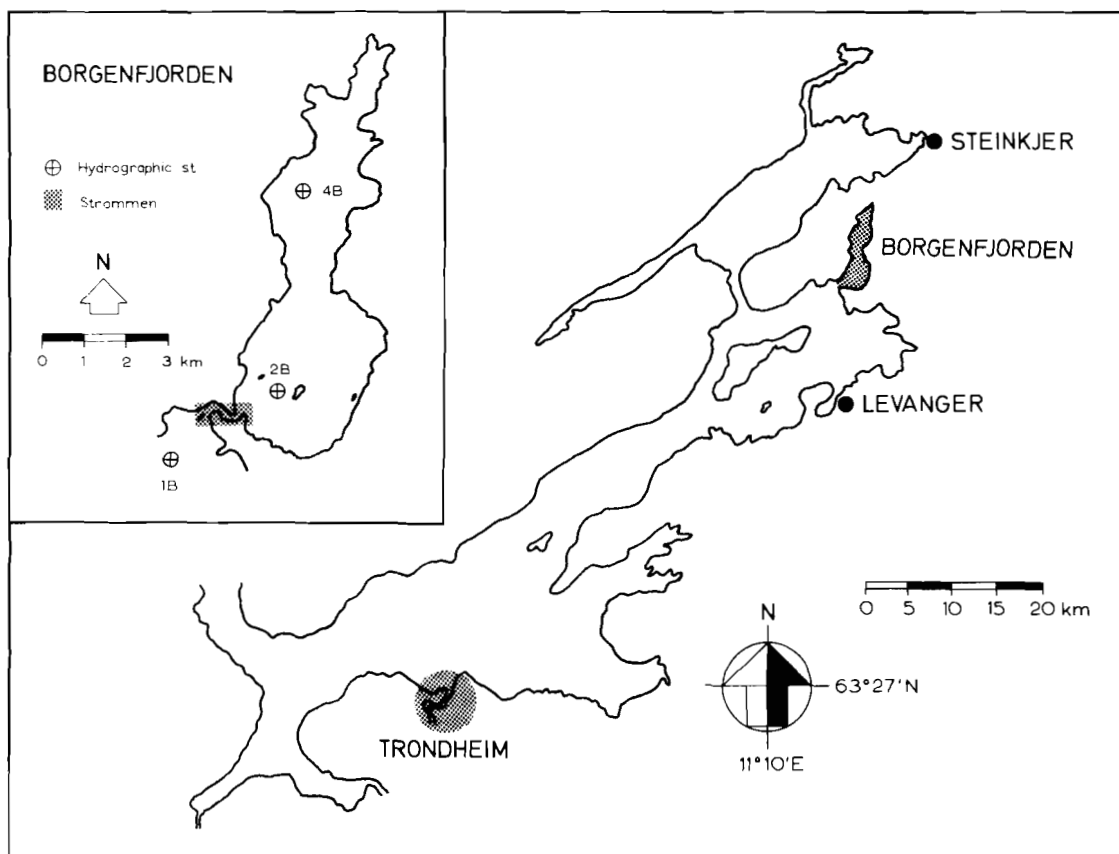


Fig. 1. Map of Trondheimsfjorden showing the location of the landlocked basin Borgenfjorden (after E. Lande & Gulliksen 1973).

of Rolsøy, and on the threshold between the two basins. Medium types of sediment are mainly found in the southern basin. The soft bottom material has a high content of organic matter (Strömngren et al. 1971).

The water masses of Borgenfjorden originate from the surface layers of Trondheimsfjorden proper, and 50% of the water masses are renewed over a period of 11-14 days (McClimans 1973). The tidal current through Strømmen, which may reach a speed of 5 m/sec near the surface (McClimans 1973), produces strong turbulence in the water masses of the southern basin, which are therefore practically homogeneous throughout the whole water column.

In the northern basin, however, a pycnocline is formed at about 15-20 m depth during the summer. Decomposition of trapped

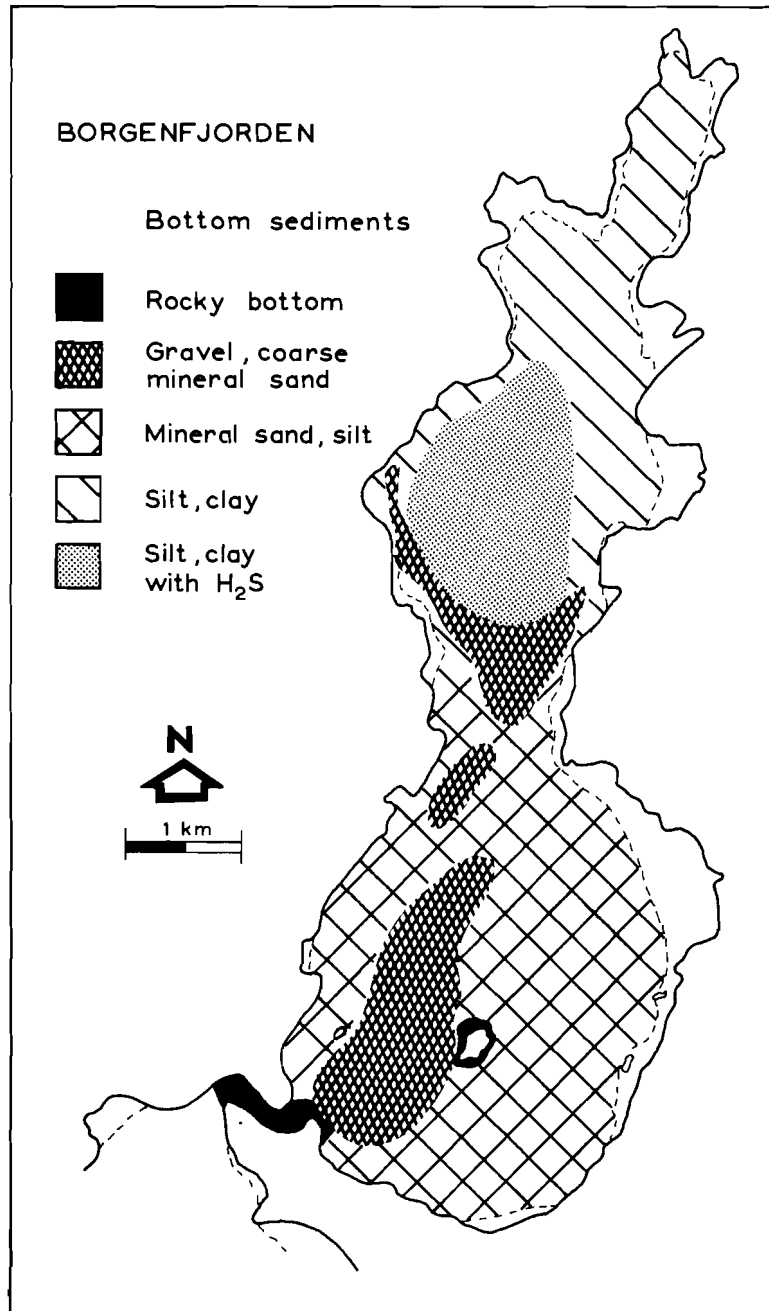


Fig. 2. Distribution of the main types of bottom sediments found in Borgenfjorden (after Gulliksen 1971).

organic matter below the pycnocline results in oxygen deficiency, and H₂S is formed. An annual renewal of the stagnant bottom water starts in the autumn or early winter and continues throughout the winter.

The water temperature usually ranges annually from 1^o to

TIDLIGERE UTKOMMET I SERIEN

1. Strømgren, T. 1971. Zooplankton investigations in Skjomen. Preliminary report, November 1969 – January 1971. 25 pp.
2. Malme, L. 1971. Oseaniske skog- og heiplante-samfunn på fjellet Talstadhesten i Fræna, nordvest-Norge, og deres forhold til om-givelsene. 39 pp. 12 Tab.
3. Baadsvik, K. 1971. Om klimaet ved jordover-flaten og de temperaturforhold fjellplantene lever under. 28 pp.
4. Mæhre Lauritzen, E. 1972. Mosefloraen på Bergsåsen i Snåsa, Nord-Trøndelag 1972 pp.
5. Farbregd, O. 1972. Pilefunn frå Oppdalsfjella. 138 pp. 17 pl.
10. Gulliksen, E. H. 1973. Jan Mayen – en bibliografi. 22 pp.
11. Lande E. 1973. Growth, spawning, and mortality of the mussel (*Mytilus edulis* L.) in Prestvaagen, Trondheimsfjorden. 26 pp.
12. Aune, E. I. 1973. Forest vegetation in Hemne, Sør-Trøndelag, Western Central Norway. 87 pp.
13. Strømgren, T. 1973. Zooplankton investigations in Trondheimsfjorden, 1963–66. 149 pp.
14. Strømgren, T. 1973. Vertical distribution and numerical variation of zooplankton in the upper to m at one station in Trondheimsfjorden. 54 pp.
15. Iversen, T.-H. 1974. The roles of statoliths, auxin transport, and auxin metabolism in root geotropism. 216 pp.
16. Evensen, D. 1974. The benthic algae of Borgenfjorden, North-Trøndelag, Norway. 18 pp.
17. Strømgren, T. 1974. Zooplankton and hydro-graphy in Trondheimsfjorden on the west coast of Norway. 35 pp.
18. Skogen, A. 1974. Karplantefloraen i Ørland herred, Sør-Trøndelag, nyfunn og forandringer etter 10 år. 49 pp.
19. Gulliksen, B. 1974. Marine Investigations at Jan Mayen in 1972. 46 pp.
20. Sneli, J.-A. 1974. A collection of marine mollusca from Møre and Romsdal, North-western Norway. 17 pp.
21. Gulliksen, B. 1974. The Ascidian fauna on level bottom areas in the Borgenfjord, 1967–1973. 18 pp.
22. Malme, L. 1975. Phytosociological studies of aquatic and marsh vegetation in Møre og Romsdal, Western Norway. 30 pp.

