

Fossils from Surtsey — A preliminary report

By

LEIFUR A. SÍMONARSON

Science Institute, University of Iceland
Jardfræðahátís Háskólans, Reykjavík

During the Surtsey eruption 1963-1967 fossiliferous sedimentary xenoliths were carried upwards with the hot magma and are now found in the tephra on Surtsey (Fig. 1). Similar fossil-

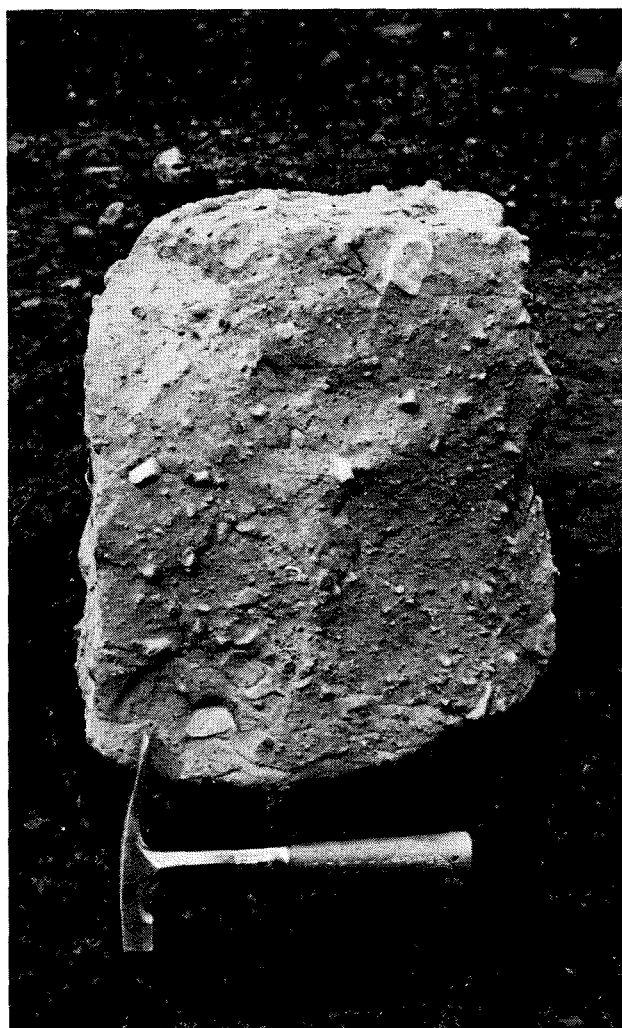


Fig. 1. Fossiliferous sedimentary xenolith on Surtsey. Length of hammer 28 cm. — Photo L. A. Símonarson, 4. VII. 1972.

-bearing xenoliths are also known on Heimaey (Jakobsson, 1968 p. 115). Data from a 1565 m deep drillhole on Heimaey (Pálmason et al., 1965) show a thick series of sedimentary layers in the stratigraphic column below the Vestmann Islands (Fig. 2). Those beds have probably supplied the fossiliferous xenoliths on the islands. The petrological aspect of the xenoliths from Surtsey has been dealt with by Alexandersson (1970, 1972). Furthermore, Alexandersson had some fragments of *Arctica islandica* (Linné) dated radiometrically, but according to him (1970 p. 86) it was possible to identify four species of marine invertebrates from the xenoliths. The dated *Arctica* fragments were taken from two blocks; "one block (mainly "outer fraction") was approximately 11.000 years old while the other (mainly "inner fraction") was 6.200 years." (Alexandersson, 1972 p. 106). These dates indicate Late Quaternary age.

The present author has during the last years investigated fossils in sedimentary xenoliths from Surtsey. These were partly collected by the author, partly by others. The fossils found in the xenoliths in question are listed below.

A. Foraminifera:

- Quinqueloculina seminulum* (Linné, 1758) (15 specimens).
- Triloculina trihedra* Loeblich & Tappan, 1953 (1 specimen).
- Pyrgo williamsoni* (Silvestri, 1923) (3 specimens).
- Miliolinella subrotunda* (Montagu, 1803) (3 specimens).
- Miliolinella* cf. *enoplostoma* (Reuss, 1851) (7 specimens).
- Polymorphinidae (1 specimen).
- Oolina acuticosta* (Reuss, 1862) (3 specimens).
- Oolina melo* d'Orbigny, 1839 (1 specimen).
- Fissurina danica* (Madsen, 1895) (1 specimen).
- Fissurina marginata* (Walker & Boys, 1784) (4 specimens).
- Parafissurina lateralis* (Cushman, 1913) forma *simplex* (Buchner, 1940) (1 specimen).

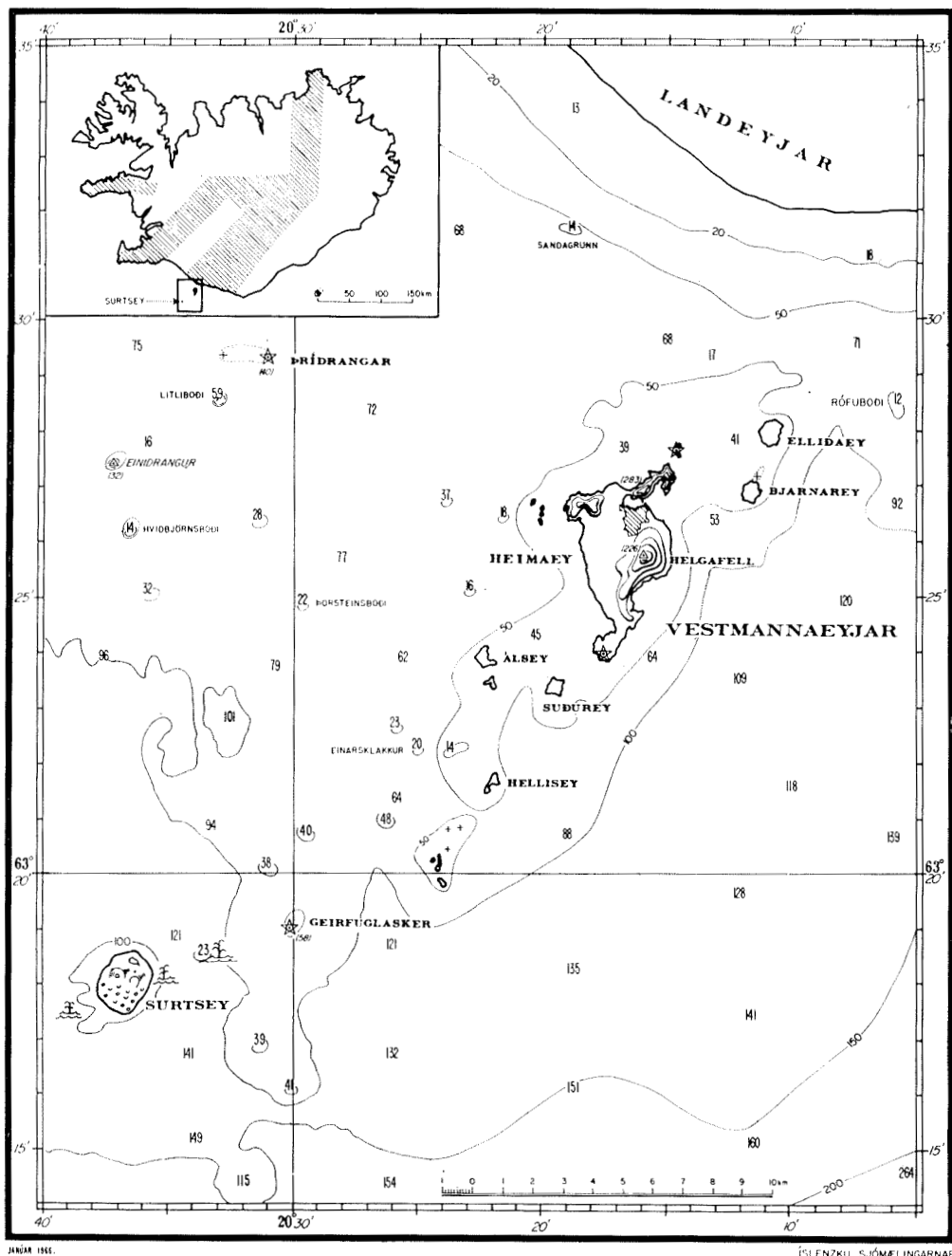


Fig. 2.
Map showing the location of the Vestmann Islands. Striated on the key map is the neovolcanic areas. (From Thorarinsson, 1965).

- Bulimina marginata* d'Orbigny, 1826 (1 specimen).
Trifarina angulosa (Williamson, 1858) (7 specimens).
Trifarina fluens (Todd, 1947) (1 specimen).
Cassidulina crassa d'Orbigny, 1839 (39 specimens).
Cassidulina laevigata d'Orbigny, 1826 (2 specimens).
Buccella frigida (Cushman, 1922) (4 specimens).
Cibicides lobatulus (Walker & Jacob, 1798) (299 specimens).
Nonion barleeanum (Williamson, 1858) (19 specimens).
Astrononion gallowayi Loeblich & Tappan, 1953 (4 specimens).
Pullenia subcarinata (d'Orbigny, 1839) (1 specimen).
Elphidium albumbilicatum (Weiss, 1954) (12 specimens).
Elphidium clavatum Cushman, 1930 (40 specimens).
Elphidium groenlandicum Cushman, 1933 (3 specimens).
Elphidium macellum (Fichtel & Moll, 1798) (2 specimens).
Elphidium subarcticum Cushman, 1944 (33 specimens).
Globigerina bulloides d'Orbigny, 1826 (32 specimens).
Globigerina pachyderma (Ehrenberg, 1861) (30 specimens).
Globigerina sp. (8 specimens).

B. Serpulidae:

- Pomatoceros triqueter* Linné, 1761 (several tubes).

C. Mollusca:

- Lepeta caeca* (Müller, 1776) (1 fragmentary specimen).
Eumetula (Laskeya) costulata (Møller, 1842) (1 fragmentary specimen).
Trichotropis cf. borealis Broderip & Sowerby, 1829 (2 fragmentary specimens).
Aporrhais pespelecani (Linné, 1758) (1 complete and 21 fragmentary specimens).
cf. Natica (Tectonica) affinis (Gmelin, 1789) (1 fragment).
Colus glaber (Verkrüzen, 1876) (1 spire).
Dentalium entale Linné, 1758 (10 specimens; some of them are fragmentary).
Nuculana cf. minuta (Müller, 1776) (1 valve).
Mytilus edulis Linné, 1758 (1 fragment without umbo).
Crenella decussata (Montagu, 1808) (2 valves).

Chlamys islandica (Müller, 1776) (1 fragment without umbo).
Pododesmus (Heteranomia) squamula (Linné, 1758) (22 valves and 10 umbonal fragments).
Tridonta (Tridonta) borealis (Chemnitz, 1784) (1 valve).
Tridonta (Tridonta) elliptica (Brown, 1827) (4 umbonal fragments).
Tridonta (Nicania) montagui (Dillwyn, 1817) (2 valves and 1 umbonal fragment).
Arctica islandica (Linné, 1767) (several fragments without umbo).
Acanthocardia echinata (Linné, 1758) (1 umbonal fragment and 3 fragments without umbo).
Spisula elliptica (Brown, 1827) (1 valve).
Macoma calcarea (Chemnitz, 1782) (2 valves).
Hiatella arctica (Linné, 1767) (2 fragments without umbo).

D. Cirripedia:

Balanus sp. (1 fragmentary parietal plate).
Balanus (Chirona) hameri (Ascanius, 1767) (1 parietal plate).

E. Bryozoa:

Tessaradoma gracile (Sars, 1863) (1 fragment).
Escharella cf. *immersa* (Fleming, 1828) (2 fragments).
 Indet. encrusting ascophoran (1 fragment).

The marine fauna consists entirely of species living at the present time which is in agreement with the radiocarbon dates. The fauna is, moreover, north boreal, i.e. similar to the fauna of South Iceland today. Several species of foraminifera found in the xenoliths have not been recorded as living nowadays in Icelandic waters. However, the recent foraminifera fauna of Iceland is not sufficiently well known, so a comparison is probably of no great importance. The same seems to be true of the bryozoans. The species are all benthonic with the exception of a few plankton forms of foraminifera belonging to the genus *Globigerina*. It is noteworthy that the shells are generally out of growth position

and certainly somewhat transported. The fauna seems, however, to indicate a depth of formation somewhat greater than 100 m. In this context it must be mentioned that the Surtsey eruption penetrated the Icelandic shelf where the water depth was about 130 m (see also discussion in Alexandersson, 1970 p. 88).

A more detailed paper dealing with the fossils from Surtsey is now in progress.

ACKNOWLEDGEMENTS

The author is most indebted to Dr. phil. R. W. Feyling-Hanssen and cand. scient. K. L. Knudsen, Department of Micropalaeontology, University of Aarhus, Denmark, for their great help rendered towards the identification of the foraminifera. Thanks are also due to cand. scient. E. Håkonsson, Institute of Historical Geology and Palaeontology, University of Copenhagen, Denmark, for the identification of the bryozoans. At last, but not least, the author is grateful to all the collectors who have handed over to him sedimentary xenoliths from Surtsey.

References:

- Alexandersson, T. 1970: The sedimentary xenoliths from Surtsey: Marine sediments lithified on the sea-floor — A preliminary report. Surtsey Res. Progr. Rep. V; 83-89.
 Alexandersson, T. 1972: The sedimentary xenoliths from Surtsey: Turbidites indicating shelf growth. Surtsey Res. Progr. Rep. VI; 101-116.
 Jakobsson, S. 1968: The geology and petrography of the Vestmann Islands — A preliminary report. Surtsey Res. Progr. Rep. IV; 113-130.
 Pálmason, G., Tómasson, J., Jónsson, J. & Jónsson, Í. 1965: Djúpbörur í Vestmannaeyjum. State Electricity Authority, Reykjavík. 43 pp. Mimeographed.
 Thorarinsson, S. 1965: Sitt af hverju um Surtseyjargosið. Náttúrufr. 35 (4); 153-181.