

First record of *Halicardia flexuosa* (Verrill & S. Smith, 1881) (Bivalvia: Verticordiidae) alive in Icelandic waters

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ABSTRACT. For the first time, the bivalve *Halicardia flexuosa* (Family Verticordiidae) was found alive South-West of Iceland at 1300 m depth.

RESUME. Pour la première fois, le bivalve *Halicardia flexuosa* (Famille Verticordiidae) a été récolté vivant au sud-ouest de l'Islande par 1300 m de fond.

INTRODUCTION

Halicardia flexuosa (Verrill & S. Smith, 1881) is a bathyal or abyssal bivalve of the family Verticordiidae. The different reports of findings are from 137 m for loose valves to 2330 m at Cape Blanc (Mauritania) (Soot-Ryen 1966).

Oliver et al. (2016) give an excellent description of the shell. Soot-Ryen (1966) pointed out an interesting characteristic of the deepest internal part of the valves between the posterior muscle scar and the lower part of the anterior one. While the interior of the shell is whitish and pearly, at this place the inner surface is yellowish-brown, when dried this coloured part looses from the shell as a thin coloured film. This locally restricted internal layer of conchioline (made of organic macromolecules) is secreted by the corresponding part of the mantle.

Originally the species was described as *Mytilimeria* but later attributed to the genus *Halicardia* Dall, 1895 (Marshall et al. 2014). Most of the records of this bivalve date back to the end of the 19th and the beginning of the 20th century. It was recorded from different locations in the Atlantic Ocean. Reports are mentioned as coming from the east coast of the United States (off Nova Scotia, East of Georges Bank, ...) and from the eastern Atlantic [South Africa (Cape Point), Tropical Africa, Mauritania (Cape Blanc), ...] (Soot-Ryen, 1966).

The first mention of this species in European waters (3 living specimens, one valve) dates from 1910 (Grieg 1920 in Muray & Hjort 1932). Collected during the "Michael Sars" North Atlantic deep sea expedition 1910, it was recorded at 57°41'N, 11°48'W which is located West of Scotland at 1853 m.

Recently Gebruk et al. (2010) have mentioned in their study on the mid-Atlantic ridge the presence of *H. flexuosa* on the Charlie-Gibbs Fracture Zone (52°08'N, 34°52'W) at 1650 m. Although the samples taken by this expedition were declared conserved in alcohol there is no information as to whether the bivalves were alive or not.

Different drawings exist in old publications. Nevertheless true pictures of a specimen can be found on the site of the National Museum of Wales (Oliver et al. 2016) and on the site of the Smithsonian Institution where the holotype is deposited. Dautzenberg (1927) presented the specimens brought by the "Prince de Monaco" expedition 1913 (Fig. 1A) from trawling station at 42°40'N, 62°49'30"W and 1458 m depth (East coast of Canada). The Royal Institute of Natural History of Belgium (IRSNB), which hosts the Dautzenberg collection, possesses loose valves of the same origin (Fig. 1B) as "variety major" because it was much larger than the other specimens of the species known at that time.

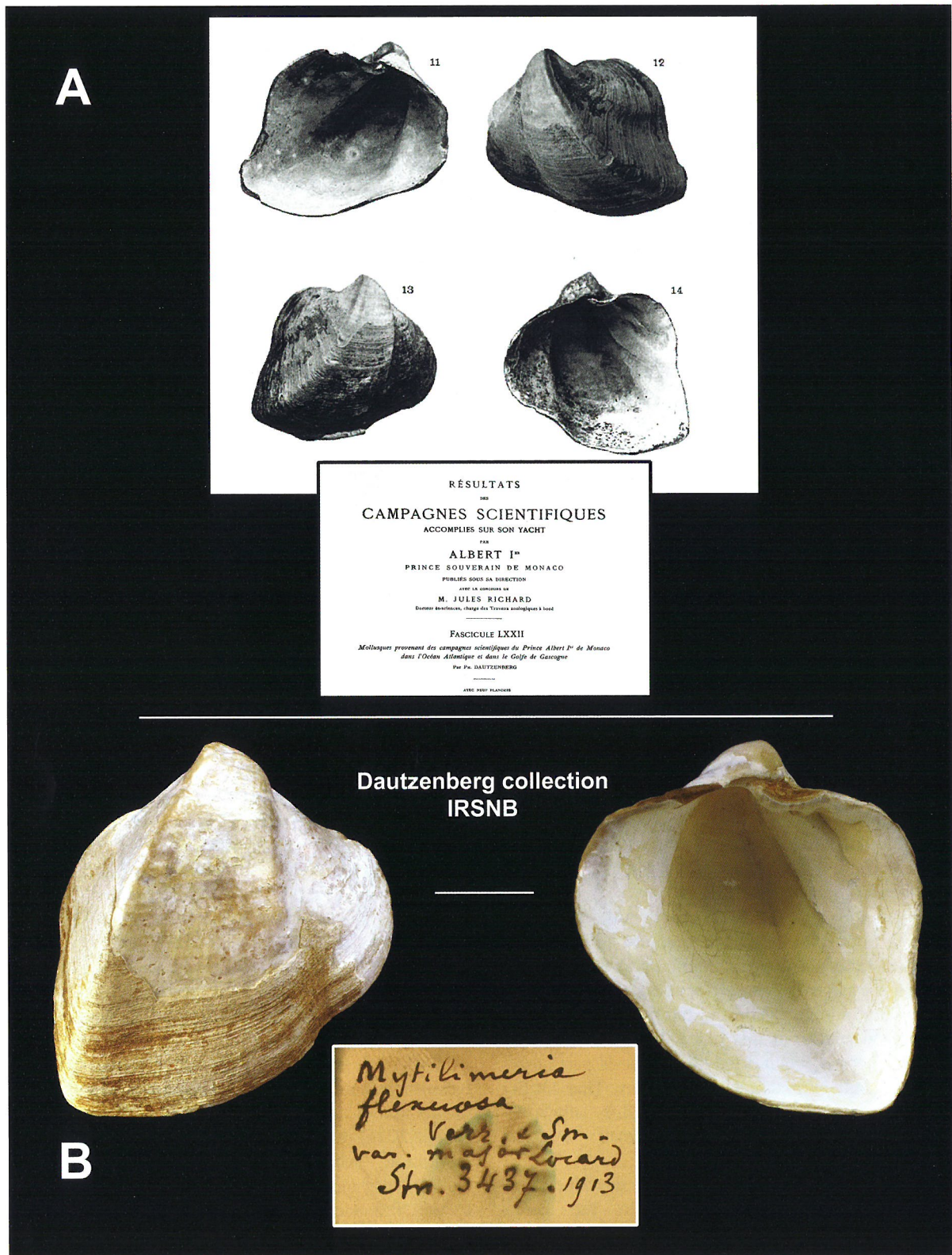


Figure 1

A. Detail of plate IX - Molluscs - ex Dautzenberg 1927 - *Mytilimeria flexuosa*, figs 11 - 14. **B.** *Mytilimeria flexuosa* right valve IRSNB, external and internal, most probably the same valve as represented on plate IX (Dautzenberg 1927), figs 13 and 14. - 39.0 x 37.4 mm.

MATERIAL, METHODS AND RESULTS

The Marine and Freshwater Research Institute of Iceland carries out an annual autumn ground fish survey for stock assessment of the demersal fish stocks, covering the shelf area around Iceland, as well as the deeper parts off the shelf break. On the 8th of October 2015, the research vessel Árni Friðriksson during one of its trawls collected two living specimens of *Halicardia flexuosa* accompanied by some loose valves South-West of Iceland (station A10-2015-550; net set at 63°0540 N, 26°5270 W and 1306 m depth; net hauled at 63°0840 N, 26°5255 W and 1281 m depth; bottom temperature 3.8°C). The molluscs were all found in a block of clay. A first picture of specimen 1 and 2 was immediately taken on board (Figs 2A-B). Later the frozen soft parts of the shells were preserved in alcohol for further DNA characterization and pictures were taken (Figs 2C-D). The sizes are respectively 33.2 x 35.3 x 31.3 mm (specimen 1) and 26.3 x 29.0 x 22.2 mm (specimen 2). On the internal view of specimen 1 showing the hinge, the lithodesma (li) can clearly be seen (Fig. 2C). The yellowish-brown layer of conchioline (cl), the anterior adductor scar (aa), the posterior one (pa) and the rudimentary tooth of the hinge can also clearly be seen on an internal view of a right loose valve - 22.2 x 22.8 mm (Fig. 2E).

DISCUSSION

All the representations of *Halicardia flexuosa* show a quite uniform aspect throughout the Atlantic Ocean. Some minor variations are mentioned by Dautzenberg (1927) concerning the size of the specimens collected and by Soot-Ryen (1966) on the exact form of the auricle of the valves.

Until now the only findings in European waters were West of Scotland, and possibly in the Charlie Gibbs fragment zone. It is now also found alive in Icelandic waters.

CONCLUSION

Halicardia flexuosa is now found alive South-West of Iceland extending the range of distribution of this bivalve to this area. The depth of sampling in the range of 1300 m is in accordance with previous records. As increasingly deep trawling could be done it is most probable that this species will be found all over the deep North-Atlantic bottom from both sides of the Mid-Atlantic Ridge and also at least in the Eastern part of the South-Atlantic Ocean. To our knowledge there is no information on this species

from the Western part of the South-Atlantic Ocean.

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REFERENCES

- Dautzenberg, P. 1927. *Résultats des campagnes scientifiques accomplies sur son yacht par Albert Ier Prince souverain de Monaco*. Fascicule LXXII, 400 pp + erratum and 9 Plates.
- Gebruck, A.V., Budaeva, N.E. & King, N.J. 2010. Bathyal Benthic Fauna of the Mid-Atlantic Ridge between the Azores and the Rekjanes Ridge. *Journal of the Marine Biological Association of the United Kingdom*. 90(1): 1-14.
- Grieg, J.A. 1920. Brachiopoda, Scaphopoda, Gastropoda and Lamellibranchiata, 1-16 + 1 Plate : in Murray, J. & Hjort, J. 1932. *Report on the Scientific Results of the "Michael Sars" North Atlantic Deep-Sea Expedition 1910*. Trustees of the Bergen Museum. Volume III part 2: 252 pp.
- Marshall, B., Huber, M., Rosenberg, G. 2014. *Halicardia flexuosa* (Verrill & S. Smith [in Verrill], 1881). In: MolluscaBase (2016). Accessed through (2016-06-29): World Register of Marine Species at <http://www.marinespecies.org/aphia.php?p=taxdet&ails&id=156779>
- Oliver, P. G., Holmes, A. M., Killeen, I. J. & Turner, J. A. 2016. *Marine Bivalve Shells of the British Isles*. Amgueddfa Cymru - National Museum Wales. Available from: <http://naturalhistory.museumwales.ac.uk/britishbivalves> [Accessed: 2016-04-30].
- Smithsonian Institution, National Museum of Natural History Collections, Department of Invertebrate Zoology. <http://collections.nmnh.si.edu/search/iz/> [Accessed: 2016-04-30].
- Soot-Ryen, T. 1966. Revision of the Pelecypods from the Michael Sars North Atlantic Deep-Sea Expedition 1910, with Notes on the Family Verticordiidae and Other Interesting Species. *Sarsia*, 24: 1-31.

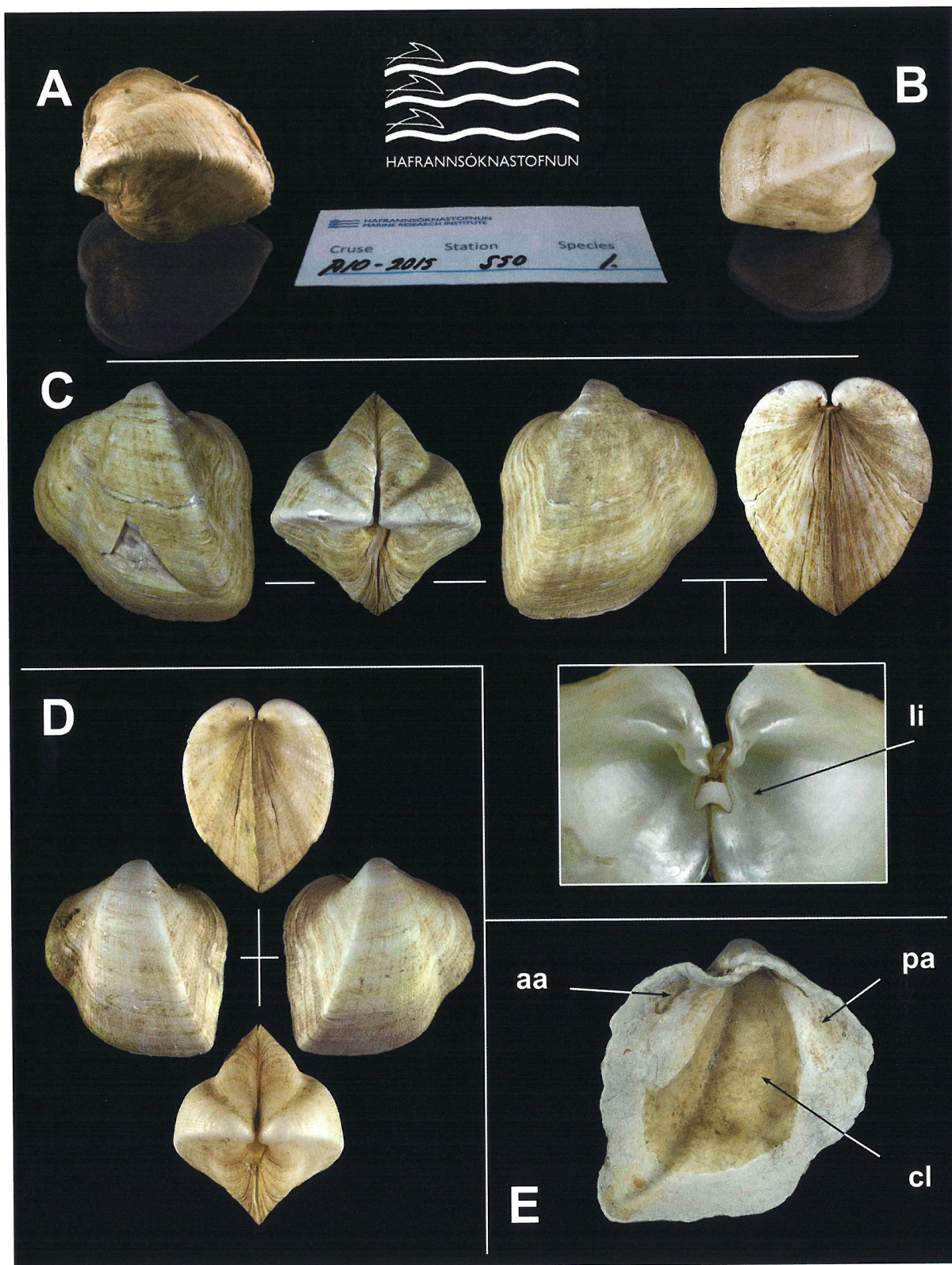


Figure 2

A - E: *Halicardia flexuosa* - South-West Iceland. **A-B:** Pictures taken on board (by Svanhildur Egilsdóttir). **A.** Specimen 1: 33.2 x 35.3 x 31.3 mm. **B.** Specimen 2: 26.3 x 29.0 x 22.2 mm. **C-D:** Studio pictures (by C. Delongueville). **C.** Specimen 1: external and internal (**li**: lithodesma). **D.** Specimen 2. **E.** Loose valve, internal view (**aa**: anterior adductor scar, **pa**: posterior adductor scar, **cl**: conchiolin layer) - 22.2 x 22.8 mm.