SHORT NOTES

BELEMNITE FRAGMENTS FROM THE CUMBERLAND BAY TYPE SEDIMENTS OF SOUTH GEORGIA

By P. STONE *and* L. E. WILLEY

ABSTRACT. Two belemnite-bearing cobbles of coarse sandstone, derived from Cumberland Bay type volcanic greywackes, were collected from the north-east coast of South Georgia. These fragments of *Belemnopsis*-like guards suggest an Upper Jurassic–lowest Cretaceous age.

DURING the course of geological mapping on the north-east coast of South Georgia in December 1971, two cobbles of coarse sandstone containing belemnites were collected from the terminal moraine of Ross Glacier in Little Moltke Harbour (lat. 54° 32′ S., long. 36° 05′ W.).

Texturally, the sandstones are greywackes, containing 19·7 and 20·6 per cent of matrix, respectively, with angular to sub-rounded grains of andesitic lava, albitized plagioclase and siliceous resistates. As such, they are petrologically similar (Fig. 1) to the Cumberland Bay type greywackes (Trendall, 1959) exposed on the glacier margins farther inland, but they are markedly dissimilar from the Sandebugten type greywackes exposed to the north of Little

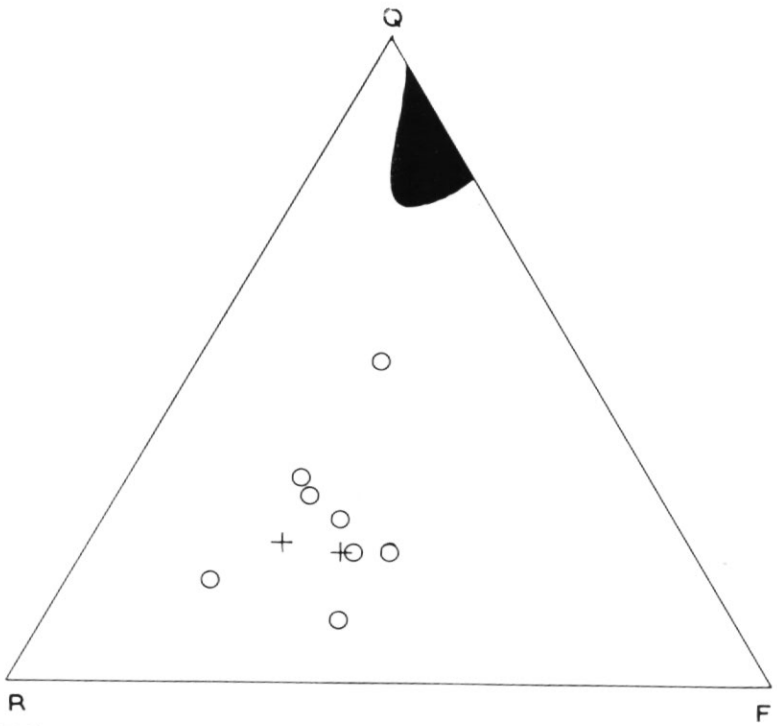

Fig. 1. A QRF diagram demonstrating the petrological affinities of the belemnite-bearing cobbles to the Cumberland Bay type greywackes.
Q Siliceous resistates; R Andesitic lava grains; F Detrital feldspars.
○ Cumberland Bay type greywackes from the north-east coast of South Georgia.
+ Belemnite-bearing greywacke cobbles from Little Moltke Harbour.
The black area indicates the compositional range of the Sandebugten type greywackes of South Georgia.

Moltke Harbour. Because of the lithological similarity and geographical proximity of this morainic material to the country rock, the belemnite-bearing cobbles are regarded as being Cumberland Bay type volcanic greywackes.

Most of the fossils collected from South Georgia prior to 1953 (Trendall, 1953, p. 22) and subsequently indicate only a Mesozoic age for these greywackes. Small gastropods, possibly related to the procerithiid *Rhabdocolpus* (Triassic–Lower Cretaceous), have been collected from Lighthouse Bay, Prince Olav Harbour (Skidmore, 1972, p. 21). The upper part of the Cumberland Bay type sediments, containing a "sparsely fossiliferous Aptian" [fauna] from the south coast of South Georgia (Adie, 1964*a*, p. 122, *b*, p. 308), was considered to be equivalent to the fossiliferous "Aptian" succession of nearby Annenkov Island (Wilckens, 1947). However, Casey's (1961, footnote on p. 56) observation that several of the ammonites from Annenkov Island more closely resemble Neocomian forms suggests that this succession is older than reported by Wilckens.

The two belemnite fragments (M.553.3a and b) are derived from the apical or lower stem regions of depressed guards. The beginnings of a broad, relatively shallow *Belemnopsis*-like median ventral groove is apparent at the adapical end of one fragment (M.553.3b). In the other specimen (M.553.3a) (Fig. 2), the apparent absence of any groove may indicate that the fragment was from near the apex of the guard.

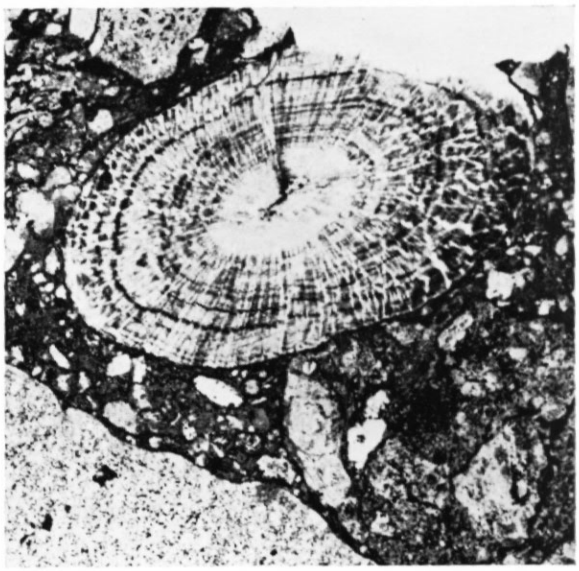

Fig. 2. Oblique cross-section through an apical fragment of a *Belemnopsis*-like guard preserved in a coarse sandstone; ×14 (M.553.3a).

As *Belemnopsis* has been reported from several Upper Jurassic–lowest Cretaceous sedimentary sequences in western Antarctica (Willey, 1973), a similar age is suggested for its occurrence in South Georgia.

MS. received 2 August 1973

REFERENCES

ADIE, R. J. 1964*a*. Geological history. (*In* PRIESTLEY, R. E., ADIE, R. J., *and* G. DE Q. ROBIN, *ed. Antarctic research*. London, Butterworth and Co. (Publishers) Ltd., 118–62.)

———. 1964*b*. Stratigraphic correlation in west Antarctica. (*In* ADIE, R. J., *ed. Antarctic geology*. Amsterdam, North-Holland Publishing Company, 307–13.)

CASEY, R. 1961. A monograph of the Ammonoidea of the Lower Greensand. Part 2. *Palaeontogr. Soc.* [*Monogr.*], 45–118.

SKIDMORE, M. J. 1972. The geology of South Georgia: III. Prince Olav Harbour and Stromness Bay areas. *British Antarctic Survey Scientific Reports*, No. 73, 50 pp.

TRENDALL, A. F. 1953. The geology of South Georgia: I. *Falkland Islands Dependencies Survey Scientific Reports*, No. 7, 26 pp.

———. 1959. The geology of South Georgia: II. *Falkland Islands Dependencies Survey Scientific Reports*, No. 19, 48 pp.

WILCKENS, O. 1947. Paläontologische und geologische Ergebnisse der Reise von Kohl-Larsen (1928–29) nach Süd-Georgien. *Abh. senckenb. naturforsch. Ges.*, No. 474, 66 pp.

WILLEY, L. E. 1973. Belemnites from south-eastern Alexander Island: II. The occurrence of the family Belemnopseidae in the Upper Jurassic and Lower Cretaceous. *British Antarctic Survey Bulletin*, No. 36, 33–59.

NOTES ON ANTARCTIC BRYOPHYTES: I. NEW RECORDS FROM THE ANTARCTIC BOTANICAL ZONE

By B. G. BELL

ABSTRACT. *Conostomum magellanicum* Sull., *Conostomum pentastichum* (Brid.) Lindb. and *Dicranum oleodictyon* Dix., species hitherto unrecorded from within the Antarctic botanical zone, are reported together with brief notes on their distribution. Details of all specimens examined are also provided.

AN examination of recent bryophyte collections from the South Orkney and South Shetland Islands has revealed the presence of species not yet reported from within the Antarctic botanical zone, as understood by Greene (1968). Owing to the necessarily lengthy studies involved in preparing a comprehensive flora of these regions, it is considered worthwhile to publish the occurrence of these species as soon as a legitimate nomenclature has been established.

This note reports three species, two from the genus *Conostomum* and a third, a species of *Dicranum*. For convenience the species are arranged alphabetically. The specimens examined are from the British Antarctic Survey's herbarium (AAS), at present housed in the Department of Botany, University of Birmingham. Herbaria holding duplicates are indicated by the contractions recommended by Lanjouw and Stafleu (1964).

Conostomum magellanicum Sull.

Syn. Conostomum perangulatum Card.

This species, first reported from Fuegia by Sullivant (1850), has recently been recorded from South Georgia (Bell, 1973). It is characterized by the 5-ranked arrangement of the leaves which lack a hairpoint and the possession of a broad ill-defined nerve ceasing below the apex. This species is found in predominantly wet habitats, e.g. wet rock ledges. Sporophytes have not been seen from the Antarctic botanical zone, although male inflorescences are present on a single specimen (R. Smith 605) from Signy Island.

Distribution in the Antarctic botanical zone

South Orkney Islands *Powell Island:* Promontory to west of John Peaks, R. Smith 253 (AAS, CHR, NY, PC, S-PA, TNS). *Coronation Island:* Olivine Point, R. Smith 132 (BM). *Signy Island:* Factory Cove, R. Smith 6 (BM), R. Smith 304 (AAS, LE); Moraine Valley, R. Smith 544 (BM); Rusty Bluff, R. Smith 605 (AAS).

South Shetland Islands *King George Island:* Keller Peninsula, R. Smith 712 (BM), Taylor 304 (AAS).

Conostomum pentastichum (Brid.) Lindb.

Syn. Conostomum australe Sw.

Conostomum rhyncostegium C. Muell.

This species, first described by Bridel (1803), has been reported as *C. rhyncostegium* from South Georgia by Müller (1890). It is the species referred to briefly by Longton (1966). *C. pentastichum* is similar to *C. magellanicum* in the 5-ranked arrangement of the leaves, but it differs in possessing a hairpoint of varying length and a narrow well-defined nerve which ceases in the hairpoint. It is a species of generally damp gravelly soil and has never been found with sporophytes on the South Orkney Islands, although both male and female inflorescences are present on a specimen from Coronation Island (Webb 133), while another specimen from Signy Island (R. Smith 457) bears only male inflorescences.

Distribution in the Antarctic botanical zone

South Orkney Islands *Coronation Island:* East side of Laws Glacier, Webb 113a (AAS). *Signy Island:* Between Observation Bluff and Polynesia Point, Longton 1087 (AAS, B, CHR, INACH, MEL, NY, PC, S-PA, TNS); Moraine Valley, Longton 1089 (BM, BA, CHR, NY, PRE, S-PA); Rusty Bluff, R. Smith 457 (AAS, BA, H, LE, MSC, O), R. Smith 460 (BM).

Dicranum oleodictyon Dix.

This species was originally described by Dixon (1935) for material from South Georgia. It is characterized by a compact growth form and regularly falcato-secund leaves which are ovate-lanceolate and possess long cells throughout. A species of rock crevices and ledges, none of the specimens from the Antarctic botanical zone bore inflorescences or sporophytes.

Distribution in the Antarctic botanical zone

South Orkney Islands *Coronation Island:* Olivine Point, R. Smith 122 (AAS). *Signy Island:* Three Lakes Valley, R. Smith 619 (BM, PC), R. Smith 628 (AAS, TNS); Ridge east of Spindrift Rocks, Holdgate 765h (AAS).

ACKNOWLEDGEMENTS

I wish to thank Mrs. D. M. Greene for her assistance in locating specimens, Dr. S. W. Greene for his help with the manuscript, and Professor J. G. Hawkes, Mason Professor of Botany, University of Birmingham, for facilities provided in the Department of Botany.

MS. received 23 March 1973

REFERENCES

BELL, B. G. 1973. A synoptic flora of South Georgian mosses: II. *Chorisodontium, Dicranoloma, Dicranum, Platyneurum* and *Conostomum*. *British Antarctic Survey Bulletin*, No. 37.

BRIDEL, S. E. 1803. *Muscologia recentiorum seu analysis, historia et descriptio methodica omnium muscorum frondosorum hucusque cognitorum ad Norman Hedwigii*. Gothae, Carol Guil. Ettinger; Paris, Barrois Junior, **2**, No. 3, 182 pp.

DIXON, H. N. 1935. More mosses from South Georgia. *K. norske Vidensk. Selsk. Forh.*, **7**, No. 1, 1–3.

GREENE, S. W. 1968. Studies in Antarctic bryology: I. A basic check list for mosses. *Revue bryol. lichen.*, N.S., **36**, Fasc. 1–2, 132–38.

LANJOUW, J. *and* F. A. STAFLEU. 1964. Index herbariorum. Pt. 1. The herbaria of the world. 5th edition. *Regnum veg.*, **31**, 1–251.

LONGTON, R. E. 1966. Botanical studies in the Antarctic during the 1963–64 and 1964–65 seasons. *British Antarctic Survey Bulletin*, No. 10, 85–95.

MÜLLER, C. 1890. Bryologia austro-georgiae. (*In* NEUMAYER, G. *Die Internationale Polarforschung 1882–83. Die Deutschen Expeditionen und ihre Ergebnisse*. Berlin, A. Asher and Co., Bd. 2, 279–322.)

SULLIVANT, W. S. 1850. Notices of several new species of mosses and Hepaticae from Tierra del Fuego. *Hooker's J. Bot. Kew Gdns Misc.*, **2**, 315–18.