



Ammonite findings from Byers Peninsula, Livingston Island, Antarctica

Амонитни находки от п-в Байърс, о-в Ливингстън, Антарктика

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Byers Peninsula is the largest ice-free area of Livingston Island, South Shetland Islands, Antarctica. Exposed Upper Jurassic–Lower Cretaceous sedimentary and volcanic rocks are included in Byers Group, which is composed of formal lithostratigraphic units. According to Crame et al. (1993) sedimentary and volcanic successions are grouped into 4 formations as follows: Anchorage Formation (Kimmeridgian–Tithonian), Devils Point Formation (Berriasian), President Beaches Formation (Berriasian) and Chester Cone Formation (Valanginian). Afterward Hathaway and Lomas (1998) revised the lithostratigraphical scheme of Crame et al. (1993) and proposed some new formal lithostratigraphic units: Anchorage Formation (Kimmeridgian–Tithonian), President Beaches Formation and Start Hill Formation (Berriasian), Chester Cone Formation (with Devils Point Member and Sealer Hill Member) (?Upper Berriasian to Valanginian) and Cerro Negro Formation (Aptian).

During the field season in 2016 we found a relatively abundant ammonite fauna in the SW part of Byers Peninsula at the vicinity of Devils Point and President Beaches areas (Fig. 1). Ammonite specimens from Devils Point area were collected from mid, dark-grey mudstones intercalated between coarse-grained sandstones beds. Mudstone-dominated sequences and coarse-grained clastic rocks, cropping out in the Devils Point area, are part of Devils Point Formation (Berriasian) according to Crame et al. (1993). Later Hathaway and Lomas (1998) include this sequence at the base of Chester Cone Formation as Devils Point Member (?Upper Berriasian).

More abundant ammonite fauna was obtained from very coarse-grain, green sandstones in the southwestern part of President Beaches area (Fig. 1). Sedimentary rocks exposed in the most western part

of the Peninsula (including our locality) are composed mainly of mudstones and small sandstone bodies, which were combined in President Beaches Formation (Berriasian). These formal units are the most fossiliferous part of Byers Group. The obtained ammonite fauna have already been subject of investigation from Chilean paleontologists and subsequently listed by Smellie et al. (1980). Based mainly on ammonite taxa (obtained from different localities at the Peninsula) the age of Byers Group was determined as Kimmeridgian to Valanginian.

In the locality in Devils Point area we recognized *Haplophylloceras strigile* (Blanford, 1864) and *Protancyloceras* sp. indet. The first one is known from the Indo-Pacific and Antarctic Realms. It is characteristic species for the Uppermost Tithonian and/or for the base of the Berriasian (Thompson, 1979; Yin, Enay, 2004). We consider that the ammonite findings from Devils Point Fm indicate Latest Tithonian–Early Berriasian age.

The following ammonite taxa were identified in the locality of President Beaches area: *Spiticeras* (*Spiticeras*) *spitiensis* (Blanford, 1864), *S. bilobatum* (Uhlig, 1903), *?Spiticeras tripartitum lovaldensis* Biro-Bagoczky, 1980 and *Argentiniceras lonchochense* (Steuer, 1897). Traditionally, the representatives of genus *Argentiniceras* have been often reported from the Lower Berriasian of Argentina and Chile, as well from Alexander Island, Antarctica. Rare findings are known from India and Yemen. *Argentiniceras noduliferum* is used as an index-species of zone, which quite recently had been positioned at the base of the Berriasian of Argentina and Chile (Aguirre-Urreta et al., 2007). Lately, the range of this zone was revised, corresponding to *S. occitanica* Zone and partly to the *S. boissieri* Zone from the Standard Mediterranean

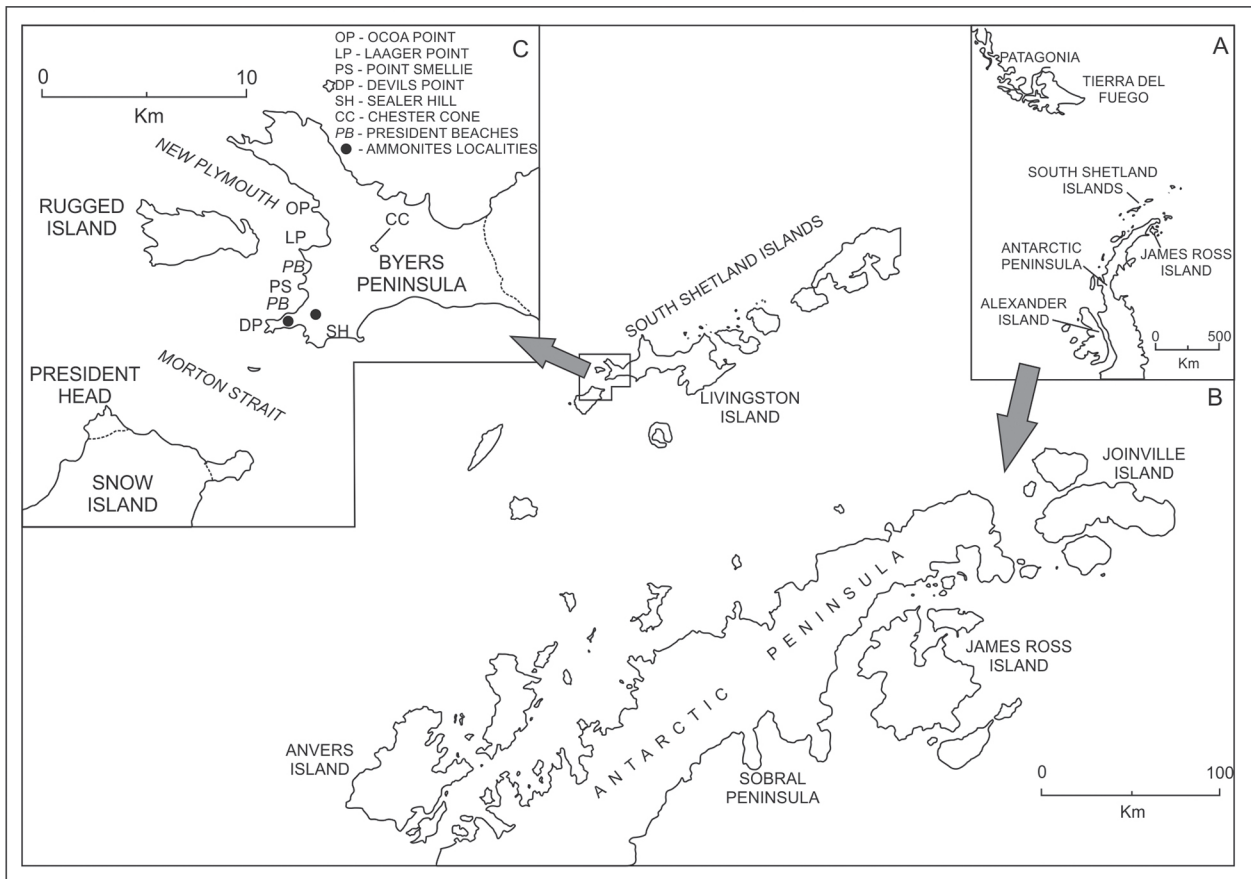


Fig. 1. Locality map of the Antarctic Peninsula Region. *A*, locality map of the Antarctic Peninsula, Scotia Arc and southernmost South America; *B*, locality map of South Shetland Islands and the position of Livingston Island; *C*, position of Byers Peninsula at the western extremity of Livingston Island (after Crame et al., 1993)

Zonal scheme (Riccardi, 2015). *Argentineras lonchochense* is a characteristic element of the ammonite association of the *Argentineras noduliferum* Zone. Genus *Spiticeras* has a wide geographical distribution and its range passes through the Jurassic/Cretaceous boundary. However, its major abundance was reported from Berriasian, including Antarctic area (Thompson, 1979). *Spiticeras damesi* was served as a zonal index for the Upper Berriasian of the Andean basins and corresponds to *S. boissieri* Zone in the Tethyan Mediterranean zonation (Aguirre-Urreta et al., 2007). This species is considered by some authors to be a synonym of *Spiticeras tripartitum* and it has the same range. Based on newly collected ammonite fauna we suggest Upper Berriasian age of this interval of President Beaches Formation.

The biostratigraphic interpretation of the newly collected fauna from the two localities allowed us to establish Upper Tithonian–Lower Berriasian age for Devils Point Fm and ?Upper Berriasian age for President Beaches Fm. Thus, the specified age gave us a reason to conclude that the Devils Point Fm has position below the President Beach Fm in accordance with the scheme of Crame et al. (1993).

References

- Aguirre-Urreta, M. B., F. A. Mourgues, P. F. Rawson, L. G. Bulot, E. Jaillard. 2007. The Lower Cretaceous Chañarcillo and Neuquén Andean basins: ammonoid biostratigraphy and correlations. – *Geol. J.*, 42, 143–173.
- Crame, J. A., D. Pirrie, J. S. Crampton, A. M. Duane. 1993. Stratigraphy and regional significance of the Upper Jurassic–Lower Cretaceous Byers Group, Livingston Island, Antarctica. – *J. Geol. Soc. London*, 150, 1075–1087.
- Hathaway, B., S. A. Lomas. 1998. The Upper Jurassic–Lower Cretaceous Byers Group, South Shetland Islands, Antarctica: revised stratigraphy and regional correlations. – *Cretaceous Res.*, 19, 43–67.
- Riccardi, A. 2015. Remarks on the Tithonian–Berriasian ammonite biostratigraphy of west central Argentina. – *Volumina Jurassica*, 13, 2, 23–52.
- Smellie, J. L., R. E. S. Davies, M. R. A. Thomson. 1980. Geology of a Mesozoic intra-arc sequence of Byers Peninsula, Livingston Island, South Shetland Islands. – *British Antarctic Survey Reports*, 50, 55–76.
- Thomson, M. R. A. 1979. *Upper Jurassic and Lower Cretaceous Ammonite Faunas of the Ablation Point Area, Alexander Island*. Cambridge, British Antarctic Survey Scientific Reports, 97, 37 p.
- Yin, J., R. Enay. 2004. Tithonian ammonoid biostratigraphy in eastern Himalayan Tibet. – *Geobios*, 37, 667–686.