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Antarctic Bioprospecting: SCAR Survey of Member Countries

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Working Paper submitted by SCAR

Summary

ATCM XLI requested SCAR to provide an update to its 2010 report contained in ATCM XXXIII WP 2 *Biological prospecting in the Antarctic region: a conservative overview of current research*.

To assist with that review SCAR has: surveyed its Member countries to assess the extent to which bioprospecting has been undertaken through national Antarctic programmes since 2010; reviewed national Antarctic science strategies to assess the extent to which bioprospecting is prioritised and reviewed the academic literature on the issue published since 2010.

This Working Paper summarises the findings. Further details on the survey results and the literature search are provided in Information Paper 12 *Antarctic Bioprospecting: SCAR Survey of Member Countries*.

Background

The issue of biological prospecting has been considered by the ATCM since the early 2000s. In 2008, ATCM XXXI requested SCAR to review the published literature that may involve biological prospecting in the Antarctic Treaty region and undertake a survey of ongoing biological prospecting research being undertaken in the SCAR community (paragraphs 308 to 310 of the Final Report of ATCM XXXI refer).

SCAR reported on the findings of its review to ATCM XXXIII in 2010 (ATCM XXXIII WP 2 *Biological prospecting in the Antarctic region: a conservative overview of current research*).

In 2018 ATCM XLI requested SCAR to update its earlier report (paragraphs 57 and 58 of the Final Report of ATCM XLI refer).

Significant considerations

In its 2010 report (ATCM XXXIII WP 2 *Biological prospecting in the Antarctic region: a conservative overview of current research*), SCAR drew the Parties' attention to several significant qualifiers that apply to this review. In updating the 2010 report, these qualifiers still apply and merit repeating briefly here (with further detail provided in ATCM XXXIII WP 2 *Biological prospecting in the Antarctic region: a conservative overview of current research*).

1. Given the lack of consensus on the definition of bioprospecting, SCAR provided two common definitions to guide the responses to its survey. The same definitions were used in the 2019 survey as were used in 2010. However, SCAR recognizes that other definitions might be adopted and that how 'bioprospecting' is defined will influence what is reported as bioprospecting research. SCAR reiterates its observation that agreement on fundamental working definitions will be essential for this discussion to be carried forward in a meaningful and deliberative manner.
2. The initial step in any bioprospecting activity is often not necessarily described as such. That is, research that is undertaken for purely descriptive taxonomic, systematic, or ecological purposes, and which is typically available publicly may be subsequently used for bioprospecting, even if it was not the original intent of the researchers.
3. Among the organisms that have been the focus of bioprospecting research in the Antarctic, some are distributed outside the Antarctic Treaty area. Accordingly, bioprospecting research involving an Antarctic organism may well have been conducted using material collected elsewhere.

SCAR member survey

SCAR circulated a survey to its 44 member countries in mid-October 2019 with responses requested by mid-December 2019. 17 responses were received by the deadline with a further five received up until mid-January 2020.

From among the 44 SCAR member countries, responses were received from 22 countries (a 50% response rate). Of the respondents, 14 are Consultative Parties to the Antarctic Treaty and eight are non-Consultative Parties (at the time of the survey).

The response rate means that a complete overview of activities being undertaken by SCAR member countries cannot be provided.

For the purposes of this survey, and consistent with SCAR's 2010 review, bioprospecting or natural products research has been referred to as:

The collection of biological material and the analysis of its material properties, or its molecular, biochemical or genetic content, for the purpose of developing a commercial product.

or

The search for valuable chemical compounds and genetic material from plants, animals and microorganisms.

By way of summary, the survey results recorded that:

- 15 (12 CPs¹ and 3 NCPs²) of 22 (68%) respondent countries confirmed that their national Antarctic programme had carried out or supported research that could be considered 'bioprospecting' against the definitions provided.
- A total of 78 projects or programmes were listed in the responses provided by the 15 countries that confirmed that their national programme had carried out or is carrying out 'bioprospecting'. These projects covered a range of environments, scientific analyses and organisms.
- 16 (10 CPs and 6 NCPs) of 22 (73%) respondent countries confirmed that their national Antarctic programme had carried out or supported research that could later be used for bioprospecting or natural products research. Three respondents qualified their positive response by noting that whilst some of their government funded projects *could* result in commercialisation at a later stage, this was not the goal or motivation for the research at the time funding was awarded.
- 4 (4 CPs) of 22 respondent countries confirmed that their national Antarctic programme had cooperated or was actively cooperating with research or commercial entities that are directly associated with bioprospecting or natural products research or commercialisation.
- 4 (4 CPs) of 22 respondent countries confirmed that at least one patent application had been applied for as a result of research undertaken or supported by their national Antarctic programme.

Assessment of National Antarctic science strategies.

Recognising the incomplete response rate to the survey among the SCAR membership, an examination was conducted of the national Antarctic science strategies or national research plans among all 44 SCAR member countries.

Of the 44 SCAR member countries:

- 13 National Antarctic Programmes publish a national Antarctic research strategy or similar (nine Consultative Parties and four Non-Consultative Parties);
- 11 National Antarctic Programmes publish their research interests and/or priorities via their website (six Consultative Parties and five Non-Consultative Parties);
- Seven National Antarctic Programmes either summarise existing research effort or have very limited information available on their Antarctic science effort (seven Consultative Parties);

¹ Consultative Parties

² Non-Consultative Parties

- no or extremely limited relevant information on their research interests was discoverable for the remaining thirteen National Antarctic Programmes (seven Consultative Parties and six Non-Consultative Parties).

Among the information that was discoverable via the searched websites, 11 National Antarctic Programmes actively and publicly identify their interests in pursuing research on the biotechnological potential of Antarctic living organisms (9 CPs and 2 NCPs).

Among the published information this intent appears at the level of a ‘programme’ or ‘theme’ or in some cases as a ‘line’ or ‘project’ within a broader programme.

With one exception, the research descriptions do not specify the organisms or ecosystems to be researched and make only broad references to the biotechnology or bioprospecting potential of ‘Antarctic organisms’, ‘Antarctic biodiversity’ or ‘Antarctic ecosystems’.

One National Antarctic Programme (a Consultative Party) makes the more specific reference in their research interests to ‘microbial communities and bioprospecting of microorganisms’.

Literature search

The findings of the literature search are provided in the Annex to Information Paper 12 *Antarctic Bioprospecting: SCAR Survey of Member Countries*. Here it is worth highlighting a recent publication that provides an extensive review of biodiversity research in Antarctica and the Southern Ocean (Oldham and Kindness 2020³). Using extensive text mining techniques, the paper provides a thorough account of the extent of Antarctic biodiversity appearing in the scientific and patent literature in multiple languages.

The paper reports on the recent growth in bioprospecting or biological prospecting appearing in the academic literature as well as the rising, albeit irregular trend in patent activity referencing Antarctica. The paper notes that, based on the text mining techniques used, the patent landscape for Antarctica can be divided into six main groups: a) sequence data b) *Candida antarctica*, c) Antarctic krill, d) other species recorded in the Antarctic, e) citations of the Antarctic scientific literature, and f) references to Antarctic place names as collection sites.

However, Oldham and Kindness make clear that considerable care needs to be applied in interpretation of the Antarctic origin of genetic resources within patent documents and whether they are actually material to or part of the claimed invention.

Recommendations

SCAR recommends that the Parties:

- 1) Note the findings of its member survey and literature search;
- 2) continue to explore open and transparent ways of reporting and collecting data and information pertinent to its discussions on the issue of biological prospecting;
- 3) Notes SCAR’s willingness to keep the ATCM informed on relevant publications as they arise.

³ Oldham, P and Kindness, J. 2020. Biodiversity Research and Innovation in Antarctica and the Southern Ocean. bioRxiv 2020.05.03.074849; doi: <https://doi.org/10.1101/2020.05.03.074849>

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