

Results of the comparison of the GBIF and Hispabiota Marina benthic marine macroalgae (Ochrophyta, Rhodophyta and Chlorophyta) databases

Alejandro Herrera-Moreno and Liliana Betancourt

Project BID-CA2020-012-INS Assessment and update of data on marine macroalgae in Hispaniola

INTRODUCTION

The present report offers the results of the second activity of the project BID-CA2020-012-INS “Assessment and update of data on marine macroalgae in Hispaniola” GBIF (2022) which is aimed at reviewing and comparing the marine macroalgae information in the databases of and those of the project Hispabiota Marina (PROECOMAR, 2022). To meet this objective, the following activities have been done: 1. Search the occurrences content of the GBIF marine macroalgae database using the key words: Rhodophyta, Ochrophyta and Chlorophyta as scientific names; and Haiti and Dominican Republic, as countries. 2. Compare directly the information in GBIF and Hispabiota Marina project databases. 3. Detect and solve possible inaccuracies in the Haitian and Dominican information (e.g., wrong geographical coordinates or species needing taxonomic updates) or missing information. Elaborate recommendations to improve and expand the GBIF databases. This report provides the results of this exercise.

RESULTS

Missing macroalgae records in GBIF

A search of the occurrences content in GBIF marine macroalgae database using the key words: Rhodophyta, Ochrophyta and Chlorophyta as scientific names; and Haiti and Dominican Republic, as countries, reveals 3,714 records from 41 museums, herbaria and collections datasets: 2,113 results for Haiti and 1,601 for Dominican Republic. The direct comparison with the Hispabiota Marine databases of Programa EcoMar reveals that, at the moment that this exercise was done, the information of twelve museums with 1,043 records (most of them with coordinates) is not yet found in the GBIF databases (Table 1).

Table 1. Number of marine macroalgae records for Haiti (H) and Dominican Republic (D) in the Hispabiota Marina (HM) database not present in GBIF.

Dataset	H	D	HM
University Herbarium, University of California, Berkeley (UC)	208	185	393
Field Museum of Natural History (F)	230	22	252
Farlow Herbarium Harvard University (FH)	119	45	164
University of South Carolina, A. C. Moore Herbarium (USCH)	68	0	68
University of North Carolina Wilmington, David J. Sieren Herbarium (WNC)	38	14	52
Drexel University, Academy of Natural Sciences (PH)	31	18	49
Naturhistoriska Riksmuseet	28	5	33
Herbarium Pacificum (BPBM-BISH)	9	0	9
University of North Carolina at Chapel Hill Herbarium (NCU)	8	0	8
University of South Florida (USF)	0	7	7
Algal Herbarium of the University Duisburg-Essen, Alemania (Uni-DUE)	0	5	5
Duke University Herbarium Algae Collection (DUKE)	0	3	3
Total	739	304	1043

There are ten north American museums in the Macroalgal Herbarium Consortium Portal (MHCP, 2022) and two European museum whose information has not yet been incorporated into the GBIF databases:

1. The University Herbarium, University of California, Berkeley (UC) has 393 records for Hispaniola 208 for Haiti and 185 for Dominican Republic.
2. The Field Museum of Natural History (F) has 252 records for Hispaniola: 230 for Haiti and 22 records for Dominican Republic.
3. The Farlow Herbarium Harvard University (FH) has 345 records for Hispaniola (193 for Haiti and 61 for Dominican Republic) but not all are in GBIF. There are at least 164 records that are not yet in GBIF: 119 for Haiti and 45 for Dominican Republic.
4. The University of South Carolina, A. C. Moore Herbarium (USCH) has 68 records for Haiti.
5. The University of North Carolina Wilmington, David J. Sieren Herbarium (WNC) has 52 records for Hispaniola: 38 for Haiti and 14 for Dominican Republic.
6. The Drexel University, Academy of Natural Sciences (PH) has 49 records for Hispaniola: 31 for Haiti and 18 for Dominican Republic.
7. Naturhistoriska Riksmuseet (NRM) has 29 records from Hispaniola: 28 for Haiti and 33 for Dominican Republic.
8. The Herbarium Pacificum (BPBM-BISH) has 9 records for Haiti.
9. The University of North Carolina at Chapel Hill Herbarium (NCU) has 8 records for Haiti.
10. The University of South Florida (USF) has 7 records for Dominican Republic.
11. The Algal Herbarium of the University Duisburg-Essen in Germany (Uni-DUE) has 5 records for Dominican Republic.
12. The Duke University Herbarium Algae Collection (DUKE) has 3 records for Dominican Republic.

To facilitate the GBIF search and correction work, the information from these museums was transferred to an DwC matrix (see RA4 in Excel): with the following fields: institution, Symbiota ID, institutionCode, catalogNumber, verbatimScientificName and countryCode, under the assistance of GBIF technician Leonardo Buitrago. The number of records from these museums (1,043) plus the 1,633 records uploaded by Programa EcoMar to the GBIF IPT (<https://doi.org/10.15468/8pys84>) as “Marine macroalgae species from Hispaniola” during the present project account for 2,675 records, more than the approximate number of records of 2,500 indicated in the project proposal.

Other corrections and suggestions to improve GBIF databases

NMNH Extant Specimen Records

Case 1. Wrong coordinates

Situation. There are 75 macroalgae records in GBIF for Caracol in the north of Haiti from the NMNH Extant Specimen Records dataset (USNM, US) that have incorrect coordinates (21.75, -72) from the source. The coordinate in the USNM collection is based on Fredericq and Norris (1986), page 188: “TYPE LOCALITY: Caracol Bay, Haiti (Hispaniola Island) [21°45'N; 72°00'W], but this coordinate corresponds to Turks and Caicos Island.

Correction. For the same locality collection (MH), Bucher *et al.* (2014), page 10, provide correct coordinates: “Haiti. Caracol reef in Caracol Bay (north coast of Haiti): reef slope, MH-1155 (coll. M.E. Hay), 3 – 18 m, 14.v.1981; and drill site (W.H. Adey) on Caracol Reef [19°45'39.91 " N; 72°01'02.26"W], MH-1264 (coll. M.E. Hay), 36.5 – 48.8 m, 11.v.1981”. In decimal degrees: 19,761086 -72,017294. This coordinate could be used, with the corresponding clarifications, to correctly identify the locality of Caracol. This correction will assist in the removal of the country coordinate mismatches that GBIF currently has with 85 records from the NMNH. To facilitate the GBIF search and correction work, under the assistance of GBIF technician Leonardo Buitrago, the information was transferred to an DwC matrix with the following fields: gbifID, institutionCode, datasetName, catalogNumber, countryCode, locality, decimalLatitude, decimalLongitude, scientificName, Issues and flags and identifier (see RA5 in Excel). On July 18, 2022 a message was sent to the USNM with no answer at the moment (Appendix 1).

Case 2. The register does not belong to Dominican Republic

<https://www.gbif.org/es/occurrence/1317783246>

Situation. The register with catalog number USNM 35906 does not belong to Haiti.

Ahnfeltia plicata (Hudson) Fries, 1836

Dataset: NMNH Extant Specimen Records (USNM, US)

Location North America Haiti Artibonite

Locality Terre Neuve

Recorded by: Bachelot de la Pylaie, A. J. M.

Correction: The distribution of the *Ahnfeltia plicata* does not include the Greater Antilles and Western Atlantic (Guiry y Guiry, 2022). It seems to be a confusion of locations: Terre-Neuve in the Artibonite department of Haiti and Terre-Neuve Island, where the collector Bachelot de la Pylaie has several classic papers: Voyage à l'île de Terre-Neuve. (1820), Notice sur l'île de Terranova et les Îles Voisines (1825) or Flore de Terre-Neuve (1829). We did not find any records of Bachelot de la Pylaie collecting in Haiti.

Naturalis Biodiversity Center (NL)

Case 1. The register does not belong to Dominican Republic

<https://www.gbif.org/es/occurrence/2516891228>

Situation. The register with catalog number NBC L.4045712 does not belong to Dominican Republic

Centroceras clavulatum (C.Agardh) Mont.

Locality: Islote Aves, W.of Dominica, N. reef. Rock, tidal zone.

Dataset: Naturalis Biodiversity Center (NL) - Botany NBC L.4045712

Correction: The locality does not correspond to the Dominican Republic. The record appears to correspond to the island of Dominica. It is probably a collection made by the botanist Wagenaar Hummelinck, who in 1949 was doing research on the island. His results are published in: Hummelinck W. (1952) Islote Aves, ein Vogeileiland in de Carai-bische Zea. West Ind. Gids 33: 23-34.

University of Michigan

Case 1. Wrong scientific names

MICH 646733

<https://www.gbif.org/es/occurrence/1989032866>

<https://macroalgae.org/portal/collections/individual/index.php?occid=231751&clid=0>

MICH 646734:

<https://www.gbif.org/es/occurrence/1988836126>

<https://macroalgae.org/portal/collections/individual/index.php?occid=231752&clid=0>

MICH 646736:

<https://www.gbif.org/es/occurrence/1988807465>

<https://macroalgae.org/portal/collections/individual/index.php?occid=231754&clid=0>

MICH 646737:

<https://www.gbif.org/es/occurrence/1989105140>

<https://macroalgae.org/portal/collections/individual/index.php?occid=231755&clid=0>

Situation. There were four species with catalog numbers: MICH 646733, 646734, 646736 and 646737, registered as *Ceramium sinicola* for Haiti in the University of Michigan Herbarium (MICH) but the image cards all say *Ceramium subtile*.

Correction. Review the records and apply the pertinent corrections. A message was sent to the University of Michigan (Appendix 1) and the error was fixed in the herbarium and in GBIF databases during the course of this project.

Duke University Herbarium

Situation. There are 135 records from the Duke University Herbarium Algae Collection (DUKE) with country: "Santo Domingo", instead of "Dominican Republic". When you make a search using "Dominican Republic" as a country keyword only other 33 records are obtained but those 135 are not included. It is important that the country name is displayed to ensure that all records (168) will come up in a country search.

Correction. Change country name. On July 18, 2022 a message was sent to the DUKE with no answer at the moment (Appendix 1).

REFERENCES

- Bucher, K.E., Ballantine, D.L., Lozada-Troche, C. and Norris, J.N. (2014). *Wrangelia gordoniae*, a new species of Rhodophyta (Ceramiales, Wrangeliaceae) from the tropical western Atlantic. *Botanica Marina* 57(4): 265-280.
- Fredericq, S. and J. N. Norris (1986). The structure and reproduction of *Dasya haitiana* sp. nov. (Dasyaceae, Rhodophyta) from the Caribbean Sea. *Phycologia*, 25:185-196.
- GBIF (2022). Project BID-CA2020-012-INS Assessment and update of data on marine macroalgae in Hispaniola, Programa EcoMar, Dominican Republic. <https://www.gbif.org/project/BIDCA2020-012-INS/assessment-and-update-of-data-on-marine-macroalgae-in-hispaniola>
- Guiry, M.D. and Guiry, G.M. (2022). AlgaeBase. World-wide electronic publication, National University of Ireland, Galway. *Ahnfeltia plicata* (Hudson) E.M.Fries 1836. https://www.algaebase.org/search/species/detail/?species_id=25; searched on 21 September 2022.
- PROECOMAR (2022). HISPABIOTA MARINA: Primer inventario de la biota marina de la Hispaniola. Programa EcoMar, Inc. <https://programaecomar.com/HISPABIOTAMARINA.htm>
- MHCP (2022). Macroalgal Herbarium Consortium Portal. <https://macroalgae.org/portal/>

Appendix 1. Messages exchanged with museums.

UNITED STATES NATIONAL MUSEUM

To: naturalexperience@si.edu Date: 18 July, 2022, 17:07

Dear USNM:

Programa EcoMar in Dominican Republic is implementing the GBIF Project "Assessment and update of GBIF marine macroalgae databases (Rhodophyta, Ochrophyta and Chlorophyta) from Haiti and Dominican Republic (Hispaniola)" and we are compiling all the information on macroalgae species for the island. (<https://www.gbif.org/project/BID-CA2020-012-INS/assessment-and-update-of-data-on-marine-macroalgae-in-hispaniola>) When searching the USNM Botanical Collections with the keywords: Algae (catalog), Haiti, (country) and Caracol (locality) 91 results are obtained. All the records have as coordinates centroid latitude: 21.75 and centroid longitude: -72, but these coordinates are not in Haiti, but in the Turks and Caicos Islands. It is important to correct this inaccuracy because Caracol is a key locality in the sampling of marine macroalgae in Hispaniola.

It seems that the coordinate in the USNM collection was taken from the description of *Dasya haitiana* by Suzanne Fredericq and James N. Norris (Fredericq and Norris, 1986, page 188): "TYPE LOCALITY: Caracol Bay, Haiti (Hispaniola Island) [21°45'N; 72°00'W]" present in the M. Hay y S. Fredericq Haiti collections MH-1256 (US 93577). For the same locality and collection (MH) in the description of *Wrangelia gordoniae*, Katina E. Bucher, David L. Ballantine, Chad Lozada-Troche and James N. Norris (Bucher et al. 2014, page 10) provide correct coordinates: "Haiti. Caracol reef in Caracol Bay (north coast of Haiti): reef slope, MH-1155 (coll. M.E. Hay), 3 – 18 m, 14.v.1981; and drill site (W.H. Adey) on Caracol Reef [19°45'39.91 " N; 72°01'02.26"W], MH-1264 (coll. M.E. Hay), 36.5 – 48.8 m, 11.v.1981". In decimal degrees: 19,761086 - 72,017294. This coordinate could be used, with the corresponding clarifications, to correctly identify the locality of Caracol.

Thank you very much for making this important information available online for marine biodiversity projects and we hope that our commentary will be useful for your prestigious institution.

Thank you very much.
Sincerely,
Alejandro Herrera-Moreno

UNIVERSITY OF MICHIGAN

To: herb-dlps-help@umich.edu Date: 20, August, 2021, 8:24

Dear University of Michigan:

Program EcoMar in Dominican Republic is implementing the GBIF Project "Assessment and update of GBIF marine macroalgae databases (Rhodophyta, Ochrophyta and Chlorophyta) from Haiti and Dominican Republic (Hispaniola)" and we are compiling all the information on algae species for the island.

Reviewing the Macroalgae Herbarium Portal we found four species (see information below) registered as *Ceramium sinicola* for Haiti in the University of Michigan Herbarium (MICH) but the image cards all say *Ceramium subtile*. We do not know if there was a later identification or an error when passing the data. We would appreciate very much if you have any explanation.

Thank you very much.

Sincerely,
Alejandro Herrera-Moreno

MICH 646733: <https://macroalgae.org/portal/collections/individual/index.php?occid=231751&clid=0>

MICH 646734: <https://macroalgae.org/portal/collections/individual/index.php?occid=231752&clid=0>

MICH 646736: <https://macroalgae.org/portal/collections/individual/index.php?occid=231754&clid=0>

MICH 646737: <https://macroalgae.org/portal/collections/individual/index.php?occid=231755&clid=0>

Dear Alejandro:

Thanks for contacting MICH.

I conferred with Dr. Michael Wynne, Curator Emeritus of Algae, and indeed, the names of the four *Ceramium* records that you found were entered in the Macroalgae Portal incorrectly. I just fixed those entries. I want to thank you for contacting us about the error. We want the data that MICH makes available to be as accurate as possible and getting input from our user community is most appreciated!

Sincerely,
Richard K. Rabeler, Ph.D.
Senior Collection Manager and Research Scientist
University of Michigan Herbarium

DUKE UNIVERSITY HERBARIUM ALGAE COLLECTION

To: pryer@duke.edu Date: 18 July, 2022, 17:07

Dear Kathleen Pryer:

Program EcoMar in Dominican Republic is implementing the GBIF Project "Assessment and update of GBIF marine macroalgae databases (Rhodophyta, Ochrophyta and Chlorophyta) from Haiti and Dominican Republic (Hispaniola)" and we are compiling all the information on macroalgae species for the island. Reviewing the Macroalgae Herbarium Portal we found 135 records from the Duke University Herbarium Algae Collection (DUKE) with country: "Santo Domingo", instead of "Dominican Republic" (see data below). So, when you make a search using "Dominican Republic" as a country keyword only other 33 records are obtained but those 135 are not included. It is important that the country name is displayed to ensure that all records (168) will come up in a country search. Thank you for making this important information available online for biodiversity studies and we hope that our commentary will be useful for your work.

Thank you very much.

Sincerely,
Alejandro Herrera-Moreno

Attached. Number of catalogs records in the Duke University Herbarium Algae Collection (DUKE) with country: Santo Domingo, instead of Dominican Republic.