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WILLIAM HEALEY DALL

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SMITHSONIAN INSTITUTION
UNITED STATES NATIONAL MUSEUM
Bulletin 112

SUMMARY OF THE MARINE SHELLBEARING MOL-
LUSKS OF THE NORTHWEST COAST OF AMERICA,
FROM SAN DIEGO, CALIFORNIA, TO THE POLAR SEA,
MOSTLY CONTAINED IN THE COLLECTION OF
THE UNITED STATES NATIONAL MUSEUM,
WITH ILLUSTRATIONS OF HITHERTO
UNFIGURED SPECIES

BY

WILLIAM HEALEY DALL

Honorary Curator of Mollusks, United States National Museum



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1921

ADVERTISEMENT.

The scientific publications of the United States National Museum consist of two series, the *Proceedings* and the *Bulletins*.

The *Proceedings*, the first volume of which was issued in 1878, are intended primarily as a medium for the publication of original, and usually brief, papers based on the collections of the National Museum, presenting newly acquired facts in zoology, geology, and anthropology, including descriptions of new forms of animals, and revisions of limited groups. One or two volumes are issued annually and distributed to libraries and scientific organizations. A limited number of copies of each paper in pamphlet form, is distributed to specialists and other interested in the different subjects as soon as printed. The date of publication is printed on each paper, and these dates are also recorded in the tables of contents of the volumes.

The *Bulletins*, the first of which was issued in 1875, consist of a series of separate publications comprising chiefly monographs of large zoological groups and other general systematic treatises (occasionally in several volumes), faunal works, reports of expeditions, and catalogues of type specimens, special collections, etc. The majority of the volumes are octavos, but a quarto size has been adopted in a few instances in which large plates were regarded as indispensable.

Since 1902 a series of octavo volumes containing papers relating to the botanical collections of the Museum, and known as the *Contributions from the National Herbarium*, has been published as bulletins.

The present work forms No. 112 of the *Bulletin* series.

WILLIAM DE C. RAVENEL,

*Administrative Assistant to the Secretary,
in charge of the United States National Museum.*

WASHINGTON, D. C., November 5, 1920.

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By WILLIAM HEALEY DALL,

Honorary Curator of Mollusks, United States National Museum.

INTRODUCTION.

To the preparation of this summary the author has brought the results of more than 50 years' study of the molluscan fauna of the northwest coast, his personal investigations in the field having begun in 1865, when, under the auspices of the Smithsonian Institution, he visited the shores of the Pacific as a member of the scientific corps of the Western Union Telegraph Expedition.

Since that time a constant inflow of material from that region has enriched the collection of the United States National Museum until it has become unrivaled in this group of animals.

Very few of the species described from the area between the southern boundary of the United States and the Polar Sea on the Pacific coast are absent from the series referred to. In a few cases where the writer has not been able to verify personally the names or the distribution from authentic specimens, the name of the authority upon whom the data rest has been added in parentheses.

The distribution of the Mollusca on the west coast of America may be allotted to three grand divisions: the Arctic or Boreal, the Temperate, and the Tropical faunas.

The first, containing many Circumboreal species, extends from the Arctic or Polar Sea to the southern limit of drift ice in winter in Bering Sea.

The Temperate division extends from this line southward on the west coast of America to Point Conception, California.

The Tropic division extends from this point southward to Point Aguja on the coast of Peru.

Each of these divisions may be subdivided into subordinate and reasonably distinct faunas: the Arctic into Eastern and Western, or

Atlantic and Pacific; the Temperate into Aleutian, Oregonian, and Californian; the Tropic into Gulf of Californian, Panamic, and Ecuadorian. These divisions coincide with differences of temperature of the sea water, generally indicated by the distribution of ocean currents.

Taking the distribution of a single family these distinctions might have their boundaries somewhat modified, but on the average of the whole molluscan fauna they appear to be well established.

The limits of these faunas are not in all cases sharply defined. Some of the less sensitive species will be found to range far beyond the divisional boundaries. In southeastern Alaska, where the in-shore channels of the Alexander Archipelago are kept cold by the drainage from glacier streams, many Arctic forms persist; perhaps relicts from the glacial period; while on the outer fringe of the islands quite a number of the more southern species extend their range northward in the warmer ocean waters.

The student of this list will notice many more species, which from southern California extend their range to Panama or even Peru, than are recorded in any previous publication.

There is a special faunula existing on the shallow plateau of northeastern Bering Sea. It is composed largely of carnivorous gastropods, which do not approach the shores. This has furnished a multitude of Buccinidae to the present summary, and was, before the incursion of the whaling fleet, the summer feeding ground of vast numbers of the Pacific walrus.

Before concluding this introduction it would be improper to omit a few words of gratitude to the numerous private students and collectors whose investigations and contributions to the collection have added a multitude of new forms to the known fauna, and to whom a large part of such completeness as this summary may possess is necessarily due. Detailed acknowledgments must await another occasion, but the evidence of their activities is on permanent record in the collections of the United States National Museum, and will afford to future students an indispensable basis for study.

Acknowledgment must also be made to the Director of the United States Geological Survey for the opportunity afforded me to work upon and publish the present paper.

In indicating a figure illustrative of the species standard works, such as are generally accessible in large libraries, have been chosen when possible. If the figure in the work referred to bears there a different specific designation from the one here adopted, it may be understood that the former name is a synonym of the one used in this summary, or for some other reason is not accepted.

Every effort to keep the classification adopted as up to date as possible has been made; though this is a subject on which differences

of opinion are to be expected. The International rules of nomenclature have been rigidly followed, in the belief that the progress of science depends largely on standardization of names, however painful it is to note the disappearance of familiar but erroneous designations. The accuracy called for by the present state of the science should not be relaxed to satisfy the protests of amateurs in taxonomy.

In compiling this list I have taken advantage of the work of my colleague, Dr. Paul Bartsch, who has with great care and intense microscopical study worked out the species of minute forms, such as the Pyramidellidae, Rissoidae, Syneeratiidae, and Caecidae, and have adopted his results as published in the Proceedings of the United States National Museum during the last few years, with only such changes as the progress of science since their publication has made advisable. Many forms which on a superficial examination by the older authors were regarded as mere mutations of a single species have proved on microscopic study to possess constant characters fully entitling them to specific rank. In general, whenever the characters seem to justify it, I have preferred to record separately forms which, on the examination of only a few specimens, might have been regarded as mere mutations. By thus separating them, often from examination of a multitude of individuals, attention is called to their characters, and future students will have an opportunity to exercise their judgment on the question of specific distinction when otherwise it might have been entirely overlooked.

Many of the species with a wide geographical range follow the isotherms, and when collected in the north appear to be denizens of moderate depths, but in the southern part of their range are found only at great depths where the temperature of the water is the same as in their more boreal habitat. It becomes difficult therefore to determine which species are really members of the archibenthical fauna. I have in the following discussion regarded only those found exclusively in depths of over 200 fathoms as belonging to that fauna, and therefore the number of species of that group in the table may seem unduly small, for many of the others also reach great depths in part of their range.

A very few exceptional cases occur where species are known from deep water in the northern part of their range yet have been obtained in moderate depths in the south. Transportation and regurgitation by fishes may account for this anomaly which must await more thorough collection of living specimens for explanation.

In certain cases of anomalous distribution reported by collectors, and when I have not examined personally authentic specimens, I have appended the name of the authority for the locality. A former habit of the Spanish women of southern California, of preparing shell work for sale to tourists and of carrying their baskets of shells toften