THE SALPIDAE COLLECTED BY THE UNITED STATES FISHERIES STEAMER "ALBATROSS," IN PHILIPPINE WATERS, DURING THE YEARS 1908 AND 1909.

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The collections of Salpidae, made by the United States Fisheries steamer *Albatross* in Philippine waters, which were submitted to me for study, are in 98 lots from 60 stations and contain 11 species and 1 new variety.

The list is as follows:

Salpa (*Cyclosalpa*) *pinnata* Forskål (1775), one individual of the aggregated form from Station D 5456, east of Southern Luzon, June 9, 1909.

Salpa (*Cyclosalpa*) *bakeri* Ritter (1905), aggregated form, from Station D 5437, between Bohol and Leyte, north of Mindanao, May 7, 1908, three specimens.

Salpa (*Ritteria*) *amboinensis* Apstein (1904), solitary form, from Station D 5530, Mindanao Sea, August 11, 1909.

Salpa cylindrica Cuvier (1804), solitary and aggregated forms, from six stations, as follows: D 5102, north of Manila Bay, January 6, 1908; D 5128, Sulu Sea, west of Negros, February 4, 1908; D 5155, southwestern end of Sulu Archipelago, February 19, 1908; D 5456, east of the southern end of Luzon, June 7, 1909.

Salpa fusiformis Cuvier (1804), solitary and aggregated forms, from seven stations, as follows: D 5120, south of Manilla Bay, January 21, 1908; D 5128, Sulu Sea, west of Negros, February 4, 1908; D 5223, at the eastern end of the passage between Luzon and Mindanao, April 24, 1908; D 5437, off the west coast of Luzon, May 8, 1908; D 5456, east of southern Luzon, June 7, 1909; D 5457, east of southern Luzon, June 8, 1909; D 5601, Molucca Passage, east of the north end of Celebes, November 7, 1909.

Salpa maxima Forskål (1775), solitary and aggregated forms, from eight stations, as follows: D 5155, D 5162, and D 5166, all at the southwestern end of the Sulu Archipelago, February 19 to 24, 1908; "Jolo Anchorage," southwestern Sulu Archipelago, March 5, 1908;

D 5186, Sulu Sea, west of Negros, March 30, 1908; D 5456 and D 5458, Pacific Ocean, off the east coast of southern Luzon, June 7 and 8, 1909; D 5669, Macassar Strait, west of Celebes, December 29, 1909.

Salpa maxima, variety *tuberculata* (new), aggregated form, Station D 5200, Mindanao Sea, southwest of Bohol, April 9, 1908.

Salpa (*Ritteria*) *hexagona* Quoy and Gaimard (1824), solitary and aggregated forms, from 11 stations, as follows: D 5128, February 4, 1908, and D 5186, March 30, 1908, both stations in the Sulu Sea, west of Negros; D 5175, north central Sulu Sea, March 8, 1908; D 5196, east of Cebu, April 3, 1908; D 5234, between Leyte and Bohol, May 7, 1908; D 5237, Pacific Ocean, east of Mindanao, May 12, 1908; D 5350, China Sea, west of Palawan, December 27, 1908; D 5437, China Sea, west of Luzon, May 8, 1909; D 5530, Mindanao Sea, east of the southern end of Cebu, August 11, 1909; D 5601 Molucca Passage, east of the northern end of Celebes, November 7, 1909; D 5616, Molucca Passage, west of Gilolo, November 22, 1909.

Salpa (*Iasis*) *zonaria* Pallas (1774), solitary and aggregated forms, from 10 stations, as follows: D 5175, north central Sulu Sea, March 8, 1908; D 5186, Sulu Sea, west of Negros, March 30, 1908; D 5402, between Cebu and Leyte, March 16, 1909; D 5456, Pacific Ocean, off the southern end of Luzon, June 7, 1909; D 5500 and D 5530, Mindanao Sea, August 4 and 11, 1909; D 5601, Molucca Passage, east of the north end of Celebes, November 7, 1909; D 5632, south of Gilolo, December 2, 1909; D 5669 and D 5672, Macassar Strait, December 29 and 30, 1909.

Salpa (*Thetys*) *vagina* Tilesius (1802), solitary form, from three stations, as follows: D 5242 and D 5243, Pacific Ocean, off the east coast of Mindanao, May 14 and 15, 1908; D 5441, China Sea, off the west coast of Luzon, May 10, 1909.

Salpa (*Thalia*) *democratica* Forskål (1775), solitary and aggregated forms, from eight stations, as follows: D 5128, Sulu Sea, west of Negros, February 4, 1908; D 5166, southwestern end of Sulu Archipelago, February 24, 1908; D 5195 and D 5196, off east coast of Cebu, April 3, 1908; an unnumbered station off "Nogas Point, Panay," February 3, 1908; D 5233, Surigao Sea, south of Leyte, May 7, 1908; D 5456, east of the southern end of Luzon, June 7, 1909; D 5588, east coast of northern Borneo, September 28, 1909.

Salpa (*Pegea*) *confederata* Forskål (1775), solitary and aggregated forms, from 21 stations, as follows: D 5140, D 5144, and three other stations, all near Jolo, central Sulu Archipelago, February 8, 10, 14, and 15, 1908; D 5196 and D 5232, east coast of Cebu, April 3 and 7, 1908; D 5224, east of Mindoro, May 7, 1908; D 5238, Pacific Ocean, off the east coast of Mindanao, May 12, 1908; D 5320, China Sea, between Luzon and Formosa, November 6, 1908; D 5456, east coast of

southern Luzon, June 7, 1909; D 5530 and D 5540, northwestern Mindanao Sea, August 11 and 19, 1909; D 5553, D 5561, D 5578, and another station, all in the central and southwestern Sulu Archipelago, September 18, 19, 20, and 23, 1909; D 5604, Gulf of Tomini, Celebes, November 15, 1909; D 5616, Molucca Passage, November 22, 1909; D 5640, southeast coast of Celebes, December 13, 1909; D 5663, west of southern Celebes, December 28, 1909.

Salpa bakeri is discussed in the accompanying paper, "The Salpidae," and need be mentioned here only to say that it is a form somewhat similar to, though clearly distinct from *Salpa floridana* APSTEIN (1894, *b*). The three specimens in the *Albatross* collections are nearly adult, though still attached to one another. They are more nearly adult than any specimens of the aggregated form of this species heretofore seen.

Both the echinate form (*aspera*) and the smooth form of *Salpa fusiformis* are represented.

For a description of the new variety, *Salpa maxima tuberculata*, and of the rare and hitherto insufficiently-described *Salpa* (*Ritteria*) *amboinensis*, see the accompanying paper on "The Salpidae."

Nothing in the distribution of the species collected is very unexpected. The Salpas are purely pelagic and are likely to be carried at the will of the ocean currents. With the exception of a few species, their home is the warmer seas or the warmer currents of northern and southern seas. Those species which have thus far been reported from only a few localities are scarce forms. Their discovery is probably to be expected in time in other seas. Even the Mediterranean species have all been reported from other waters also.[1] The absence of *Salpa affinis* from these collections, and the rarity of *S. pinnata* where both might have been expected, and the presence of a rare species of this subgenus, *S. bakeri*, are noteworthy. The observed range of *Salpa maxima* is extended, for it has not been reported before from the western Pacific. In most parts of the world *Salpa democratica* and *S. fusiformis* are the most frequent and the most abundant Salpas. It is evident that *Salpa confederata* was found in Philippine waters by the *Albatross* most frequently and most abundantly.

At 11 stations more than one species of Salpidae were found at the same time.

Station D 5125, Sulu Sea, west of Panay, *Salpa democratica*, solitary and aggregated forms, and *S. cylindrica*, solitary form.

Station D 5128, Sulu Sea, west of Negros, *Salpa hexagona*, aggregated form, *S. fusiformis*, solitary and aggregated forms, *S. demo-*

[1] *Salpa polae* SIGL (1912), seems better classed as a variety of *S. pinnata* than as a distinct species. It has been known heretofore only from the Mediterranean Sea. The United States National Museum collections discussed in the accompanying paper, contain a specimen of this form from the Hawaiian Islands.

cratica, solitary and aggregated forms, *S. cylindrica*, solitary and aggregated forms, and *S. zonaria*, solitary and aggregated forms.

Station D 5155, southwestern Sulu Archipelago, *Salpa cylindrica*, solitary and aggregated forms, and *S. maxima*, solitary and aggregated forms.

Station D 5166, southwestern Sulu Archipelago, *Salpa democratica*, solitary form, and *S. maxima*, solitary form.

Station D 5175, north central Sulu Sea, *Salpa hexagona*, aggregated form, and *S. zonaria*, aggregated form.

Station D 5186, Sulu Sea, off Negros, *Salpa hexagona*, aggregated form, *S. zonaria*, solitary form, and *S. maxima*, aggregated form.

Station D 5196, between Cebu and Leyte, *Salpa hexagona*, aggregated form, *S. democratica*, solitary and aggregated forms, and *S. confederata*, aggregated form.

Station D 5437, off west coast of Luzon, *Salpa hexagona*, solitary form, *S. fusiformis*, solitary and aggregated forms, and *S. bakeri*, aggregated form.

Station D 5456, east of southern Luzon, *Salpa confederata*, solitary and aggregated forms, *S. cylindrica*, solitary and aggregated forms, *S. democratica*, solitary and aggregated forms, *S. fusiformis*, aggregated form, *S. maxima*, solitary and aggregated forms, *S. zonaria*, aggregated form, and *S. pinnata*, aggregated form.

Station D 5601, Gulf of Tomini, Celebes, *Salpa fusiformis*, solitary form, and *S. hexagona*, solitary form.

Station D 5616, Molucca Passage, *Salpa confederata*, aggregated form, *S. hexagona*, solitary form, and *S. cylindrica*, solitary form.

Other species of Salpidae, which have been reported from East Indian and western Pacific waters, and which probably occur in Philippine waters, are *S. retracta*, *S. floridana*, *S. picteti*, and *S. multitentaculata*. In addition, certain species reported from the Indian Ocean might naturally be expected to occur in Philippine seas. These are *Salpa virgula*, *S. affinis*, *Salpa longicauda*, *S. rostrata*, and *S. radiata*. Indeed no great surprise should be felt at finding any species of this family in any part of any ocean, except in polar waters, to which but few species seem to penetrate.

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