

Height of first dorsal075
Distance between dorsals.....	.25
Length of second dorsal045
Height of second dorsal.....	.04
Length of anal.....	.035
Length of caudal.....	.21
Distance from ventrals to pectorals25
Length of pectorals.....	.15
Length of ventrals.....	.045

THE SURF-SMELT OF THE NORTHWEST COAST, AND THE METHOD OF TAKING THEM BY THE QUILLEHUTE INDIANS, WEST COAST OF WASHINGTON TERRITORY.

By JAMES G. SWAN.

NEEAH BAY, WASH., *September 22, 1879.*

Thirty miles south of Cape Flattery, at the entrance to Fuca Strait, Washington Territory, is the Quillehute River, a small stream emptying into the Pacific Ocean near some rocky islets, the largest of which, named by the Indians "Alikistet," and by the whites "James Island," is a landmark for the entrance to the little bay or cove, on the shore of which is the principal village of the Quillehute Indians, who collect and dry for winter use a very choice variety of smelt (*Hypomesus olidus*), which I have named the surf-smelt, from its peculiar habit of depositing its spawn among the shingle of the beach, coming in with the surf in incredible numbers, and in this respect somewhat resembling the capelin (*Mallotus villosus*) of New Brunswick.

The surf-smelt closely resembles the common smelt in shape, size, and the peculiar cucumber-odor, but differs in having its belly covered with a coating of yellow fat, which imparts an oily appearance to water where the fish have been cleaned or washed, and makes them the very perfection of pan-fish.

During the month of August, 1879, I was at the Quillehute Indian village from the 17th to the 22d, with United States Indian Agent Charles Willoughby, and had an ample opportunity to witness the habits of the surf-smelt and their capture by the natives. These Indians take them by means of a peculiar-shaped hand-net of a parallelogram form at top, five feet long, twenty inches wide, and from four to five feet deep, with a curved handle.

The specimen net which I send is made of the fiber of the common stinging nettle (*Urtica dioica* L.), which grows in luxurious abundance on the northwest coast near Indian villages and deserted camps. A specimen of the prepared fiber is also sent with the net.

The method of preparing the nettle by the Quillehute Indians, after gathering a quantity and stripping off the leaves and twigs, is to dry the stalks in the sun or on a frame in the lodge, near, but not directly over, the fire.

When properly dried, each stalk is split open and the *shive* or woody part broken by the hand and peeled off from the outside skin or fiber. This fiber is then spun or twisted into threads or twine, by rolling between the palm of the hand and the bare leg, a process at which the women are very expert.

The Indians at present know nothing of the process of rotting the plant and breaking it to get rid of the *shive*, or of the process of hackling the fiber, and as their method is so slow and laborious, they are abandoning the use of the nettle as a textile plant, and use twine, which they either purchase ready made, or manufacture from cotton threads raveled out from flour-sacks and spun by hand, or from jute, which they procure from old gunny-bags which have been thrown away by the whites.

I think if they could be taught the process of rotting the nettle and preparing the fiber as the farmers of Kentucky prepare hemp or flax, that they would soon be able to furnish a valuable article of commerce which would pay them well for their labor.

The net I send will show the twine made by this most primitive of all methods, and indicate the many purposes for which it may be made available, but in order to be profitable it should be prepared in quantities like flax, or hemp, which it greatly resembles.

The net stitch or knot for making the mesh was not taught them by white men, but has been known by the coast Indians for ages.

Nearly thirty years ago I saw the salmon-nets of the Chinook Indians at the mouth of the Columbia River. The knowledge and use of nets antedates the advent of the first white man, but in the manufacture of the fiber and the twine they seem to have retained the most primitive ideas, and never have advanced. What little twine they now manufacture is made exclusively by the old women.

The peculiar shape of the net, and the curved handle, are to enable Indians to best use them in the surf. A straight handle could not be used.

The surf-smelt are usually most plentiful during the month of August, and come in such vast numbers that the water seems to be filled with them. Captain Carroll, of the steamer *Alexander Duncan*, plying between the Columbia River and Puget Sound, informed me that, on the 24th of August, while on his passage from Astoria to Neeah Bay, he ran through a school of smelts between Point Grenville and Quillehute which extended nearly forty miles, and at night their track was made visible by a bright phosphorescent light which emanated from them. I noticed the same luminous appearance in the surf in Quillehute Cove during each night that I remained there.

The smelts come in with the flood tide, and when a wave breaks on the beach they crowd up into the very foam, and as the surf recedes many will be seen flapping on the sand and shingle, but invariably returning with the undertow to deeper water.

An examination showed the pebbles to be incrustated with spawn, and as all the smelts I cooked were males, I concluded that the females had first come in and cast their spawn and were succeeded by the males, who deposited their milt. I handled and noticed a great many, and cooked several dozens on two successive days, but did not notice a single female. This might have been purely accidental, and perhaps at another time the catch would have proved all females.

On the first appearance of the fish, the Indians rush into the surf and press the outer edge of the net down firmly on the sand or shingle, the swash of the breaker forcing the smelts into the net. Then, as the water recedes, they turn round quickly and hold the net so that the undertow will force more smelts into it. In this way I saw them take at least a bushel at a single scoop.

In their immense numbers, these smelts resemble the eulachon, (*Osmerus pacificus*) or candle-fish, which are taken in such enormous quantities at Nass River, in British Columbia, near the southern boundary of Alaska.

After every scoop, the Indian, if successful, empties its contents on the beach, where the squaws and children quickly gather them into baskets, and carry them to the houses, where they are strung on strips of cedar bark and hung up to dry. The method of stringing them is to take each one separately and pass a half hitch with the bark around the head just back of the gills. This keeps each fish separate, and enables them to dry better.

The Quillehutes still retain the ancient superstition, formerly so prevalent among the coast tribes, relative to their fish, that the first ones must not be sold or given away to be taken to another place, nor must they be cut transversely, but split open with a muscle-shell.

I was fortunate in obtaining quarters in the house of an Indian who had a cooking-stove, where we cooked our rations as suited us. One of the Indians of our party obtained some smelts, which he boiled for supper, cooking them in the Quillehute style; he gave me some, which I fried. No sooner did the Quillehutes learn that I was cooking some of their fish than two of the head chiefs, Howcattl and Klakistokar, came to see what I was doing, as they feared I would cut the fish with a knife; but I fried them whole, and when they saw me take the nice crispy smelts with my hand and eat them entire, without aid of knife or fork, they grunted forth their satisfaction, and allowed me to purchase as many as I wished to take away. But of salmon they would neither give or sell. The fall run of the *Salmo canis* and *Salmo proteus* had just commenced to come, and while they gave us all we could eat of their own cooking, in their own houses, they refused to sell or give a single fish to be taken away. They fully believed that if we took any salmon into our canoe, all the salmon would desert the Quillehute River and follow us to Neeah Bay, and if we had cut the smelts or salmon with a knife, they all would immediately disappear in the ocean and never return.

I was unable to procure even a specimen of the salmon, but obtained enough smelts to forward some excellent specimens to Washington.

Very respectfully, your obedient servant,

JAMES G. SWAN.

Prof. SPENCER F. BAIRD,

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P. S.—I omitted to mention that the surf-smelt are common in all the salt water of Puget Sound, but I have not heard of an instance where they run up fresh-water streams to spawn, like the eastern smelt.

J. G. S.

NOTE ON THE OCCURRENCE OF PRODUCTUS GIGANTEUS IN CALIFORNIA.

By C. A. WHITE.

Among a small collection of fossils sent to the National Museum by Mr. Ludwig Kumlien, of the United States Fish Commission, from the valley of McCloud River, Shasta County, California, are three or four large examples of *Productus*, which I am unable to distinguish from *P. giganteus* Martin sp., the well-known type species of the genus as it is extensively known in European strata. They are preserved in a hard, dark-colored, argillaceous rock, which is partly metamorphosed, and they are, therefore, somewhat imperfect; but portions of them show the characteristics of the species very plainly. The largest of these Californian examples was, when perfect, quite equal in size to the larger European examples of *P. giganteus*, having had a transverse diameter near the hinge of not less than 140 millimeters, or 5½ inches.

A small collection of fossils was sent by mail from the same locality in 1877 by Mr. Livingston Stone, the species of which were recognized as of Carboniferous age, but *P. giganteus* was not among them, although the later collections indicate that they occur in the same strata. These associated forms of both collections are too imperfectly preserved for specific determination, but the genera *Fenestella*, *Streptorhynchus*, *Spirigera Camarophoria*, *Allorisma*, and *Euomphalus* are more or less satisfactorily recognized. They all together plainly indicate the Carboniferous age of the strata from which they come, which fact was also previously known through the reports of Trask and Whitney.

This, so far as I am aware, is the first discovery of *P. giganteus* in American strata. It is not a little remarkable that it should be found in the western portion of the continent and not in the middle and eastern portions, where the Carboniferous system is so well developed, and where several European species of Carboniferous brachiopoda are recognized.