from Snoqualmie Falls (N.E. of Seattle) from Puyallup river (S.W.) and from Cedar river.

The total value of the factory product in 1905 (excluding Ballard) was $25,406,574 (nearly one-fifth of that of the state), or 65∙8 % more than in 1900. The increase was particularly marked in the value of flour, $4,593,566, or 253∙9% more than in 1900. Other important manufactures in 1905 were: packed meats and slaughter house pro­ducts ($3,419,085); malt liquors ($2,121,631); foundry and machine shop products ($1,771,571)—there is a large manufactory of nuts and bolts; lumber and timber ($1,519,247) ; confectionery ($821,123) ; canned and preserved fish ($610,356) ; and ships and boats. In what was formerly Ballard, now the 13th ward, on Salmon Bay, there are large mills for the manufacture of red cedar shingles.

Seattle is the most important seaport of the state, being the commercial and industrial centre for the customs district of Puget Sound. In 1909 the net tonnage of vessels entering the harbour (local figures) was 2,467,351 tons. The foreign exports in 1908 (Harbour Master’s Report) were valued at $18,413,735, the foreign imports at $23,805,727. Its exports and imports make up the greater part of the commerce of the district, which has Port Townsend as its port of entry, and the city is rivalled only by San Francisco among the cities of the Pacific coast in the amount of its water-borne traffic. The chief exports are wheat, flour, timber, hay, potatoes, live stock, fruit, fish (salmon), oats, coal (from the mines E. of Lake Washington), hops, cotton (from the Southern States), dairy products and general merchandise; and the imports include silk, rice, coffee, tea, sugar, spices, indigo and other Oriental products. Practically all the gold from Alaska and the Yukon territory is received here, and nearly 80% of the Alaskan trade is done through Seattle. The foreign trade is with China, Japan, Siberia, Hawaii, the Philippines, Australia, Mexico, South America and Europe. The Chamber of Commerce has an excellent commercial museum.

The city was chartered in 1880, and under the charter of 1896 (as amended since) elections are biennial. By an amendment of 1908 the initiative and referendum were introduced; an initiative petition must be signed by 10 % of the voters at the preceding municipal election; a petition for a referendum on any ordinance passed by the city council must be signed by 8 % of the voters at the preceding municipal election. The city council is com­posed of one councilman elected for a two-year term from each ward (in 1910 there were 14 wards), and two councilmen elected at large and serving for four years. The municipality owns the water- supply system with its source at Cedar Lake and Cedar river, 28 m. S.E., and an electric lighting plant (for which power is derived from the falls of the Cedar river), but most of the lighting is supplied by private companies. The city has undertaken the regrading neces­sitated by the hilly site of Seattle. In 1 909 the assessed valuation of the city was $185,317,470 and the city’s debt was $8,570,380 (bonded) and $8,933,973 (net debt for local improvements).

The first permanent settlement here was made in 1852 by settlers who a year before had established New York, a village at Alki Point, on the W. side of Elliott Bay and in the present city limits. The name Seattle was given to the settlement in honour of a Dwamish chief of that name, who died in 1866 and who was friendly to the whites. In 1853 a town plat was filed, King county was erected, and Seattle became the county seat. In 1855 Seattle had a population of 300. In January 1856 in an attempt to exterminate the whites the neighbouring Indians unsuccessfully attacked Seattle, which was defended by the U.S. sloop-of-war “ Decatur.’’ The first railway reached Seattle in 1884. In 1885-1886, when there were anti-Chinese riots here led by the Knights of Labour, martial law was declared by the governor and the Chinese were defended by local vigilance committees. A destructive fire in 1889 and the financial depression of 1893 checked the city’s growth, which, however, received a new impulse from the dis­covery of gold in Alaska and the Yukon territory in 1897, as Seattle became the outfitting place for prospectors and the port to which gold was shipped. The town of South Seattle was annexed in 1905; and the city of South-east Seattle, the town of Ravenna, the town of South Park, the city of Columbia, the city of Ballard, the city of West Seattle, and Dunlap, Rainier Beach and Atlantic City were annexed in 1907. From the 1st of June to the 15th of October 1909 the Alaska-Yukon-Pacific Exposition was held in Seattle on grounds which now form part of the university campus, between Lake Union and Lake Wash­ington; of the twelve central Exposition buildings some were afterwards turned over to the university. The purpose of the

Exposition was to exploit Washington, the Yukon and the entire north-west on the Pacific slope.

SEA-URCHIN. These animals belong to the great group of Echinoderms (see Echinoderma) and to its class Echinoidea. Both the scientific and the English names denote their resem­blance to the urchin or hedgehog, the resemblance lying in the prickles with which the skin is covered. The skin itself is stiffened by a deposit of calcite (crystalline carbonate of lime) in the form of plates. If the prickles be scraped away, these plates will be seen to form a hard shell or test, in which are two openings, for the mouth and the anus. According to the position of these openings the urchins are described as Regular or Irregular. In

the Regular ur­

chins, of which

Echinus esculen-

*tus,* the edible

egg-urchin (fig.

1), and *Dorocid-*

aris papillota, the

piper (fig. 2), are

familiar ex-

amples, the test

is spheroidal with

the mouth at the

lower pole and

the anus at the

upper. In the

Irregular urchins,

of which *Spat-*

angus purpureus,

the purple heart-

urchin (fig. 3), is

a common type, the test has been drawn out into an oval or heart shape, with the mouth shifted towards the front end and the anus towards the hinder end.

The greater part of the test of a Regular urchin is divided, as a globe by meridians of longitude, into ten areas, each composed of two columns of plates. In five of these areas the plates are pierced by pairs of pores (fig. 2, *Ambulacrum),* and in life there issues from each pair a tubular process with a sucking disk at its end (fig. 1). Within the test these processes or podia are connected with five tubes arising from a tubular ring round the mouth and running upwards to the apex, where each passes out as a single process through a special plate at the end of the area to which it belongs. Since this terminal process is sometimes surrounded by pigment, as are organs susceptible to light, it has been regarded as an eye and the plate through which it passes called an ocular (fig. 2). From the ring-canal round the mouth a single tube passes straight through the body-cavity to the apex, where it opens through a sieve-like plate—the madreporite (fig. 2). Thus all this system of tubes' is placed in connexion with the outer sea-water, and is filled with it. Within the test the bottom of each podium is swollen into a little bag—ampulla—likewise full of water, and when the muscles with which it is provided pull the sides of the bag together, the water is squeezed into the podium and dilates it, so that it is stretched far out (see Echinoderma, fig. 12 D). The podium can then wave about and attach its sucker to any smooth object within reach. Each of these five areas, with the podia on each side of it extended and waving, looks like a garden avenue—Latin *ambulacrum—*and the areas are therefore called ambulacral areas, the plates composing them ambulacrals, and the whole system of water-vessels the ambulacral system. This system forms perhaps the most characteristic feature of all living Echinoderms, but it reaches its highest development in the urchins. The five areas alternating with the ambulacral areas are called interambulacral (fig. 2, *Interambulacrum);* their plates are not pierced by pores but are generally ornamented by large tubercles bearing big prickles (spines or radioles), between and around which are smaller prickles (fig. 2). The madreporite is one of five plates that surround the anal opening and alternate in position with the oculars. Each of these plates is pierced by a pore, connected on the inside with one *of* the five generative glands, and giving passage to the eggs or milt when they are ripe ; hence these plates are called genitals (fig. 2). The five genitals and five oculars together form the apical system of plates (see Echinoderma, fig. 3, A.B.). From the mouth to the anus the gut follows a coiled course, first going round the cavity of the test in one direction and then turning back on itself, while the two limbs of the loop thus formed are themselves thrown into festoons attached by strands to the wall of the test. The lower coil, next the mouth, is the stomach