

SYDNEY UNIVERSITY ENGINEERING SOCIETY.

THE MURRAY RIVER:
Irrigation and Navigation.

By ROBERT T. MCKAY,

Assistant Engineer, Water Supply Branch, Public Works Department, and
Secretary to the late Inter-State Royal Commission on the Murray River.

(A Lecture delivered before the Society on August 19th, 1903.)



THE KINYPANIEL WEIR, VICTORIA.

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SEVERAL important events of the last few years have brought the question of the Murray Waters prominently before the public. In 1897, it seemed as though the federation of the Australian States would not be consummated owing to the difficulties that had to be surmounted in connection with the question. Many of the South Australian delegates regarded the claims of their State to the maintenance of a navigable highway as paramount, and contended that the utilisation of the waters of the Murray and tributary streams by New South Wales and Victoria for the purposes of water conservation and irrigation should be subsidiary to their use for navigation.

They fought for the absolute control of the rivers, but this was sternly resisted by the New South Wales and Victorian representatives. One of the South Australian delegates, however, Mr. (now Sir) Josiah Symon, stated at the Federal Convention that:—"Indeed, so far as I am concerned, if it is a comparison of benefits, if it ever came to that, I do think that it would be better, and more in the interests of Australia, that the whole of the River Murray should be drained, in order that the millions of arid acres in New South Wales, Victoria, and South Australia should be irrigated and made fertile—should be made to smile with abundant harvests—than that navigation should be preserved." The action of Sir Josiah Symon caused the matter to be regarded in a somewhat different light by South Australian extremists, and it was eventually agreed that the Commonwealth Parliament should have power to control trade and commerce which embraces the navigation of the rivers. It was furthermore agreed that

“the Commonwealth should not, by any law or regulation of trade, abridge the right of a State to the reasonable use of the waters of the rivers for conservation and irrigation,” and a clause to this effect was

Plate 1.

inserted in the Commonwealth Constitution Act.

Much has been written on the subject, and there is no question now before the people of New South Wales of greater importance than the conservation of the water supply, and the reclamation of the arid and semi-arid lands of the Central and Western Divisions of the State. A thorough knowledge of the water supply, its fluctuations and limitations, is essential in whatever aspect the future of the public lands may



CLIFF ON THE MURRAY, S.A.

be considered, but the difficulty of obtaining systematic knowledge can be best appreciated when the vast extent of the immense catchment area and peculiar conditions of the Murray Basin and tributary streams are considered.

MURRAY BASIN.

At the request of the Council of the Sydney University Engineering Society this lecture has been prepared, giving a brief description of the Murray and contributing streams, and illustrating by photographs the various points of interest on the rivers, the class of boats that trade thereon and the irrigation works that have been constructed in Victoria, which will give the reader some idea of the energy displayed by Victorians in the utilisation of the water for the purposes of irrigation.

The map of Australia (Plate 2) indicates the drainage area of the Murray Basin in relation to the Australian Continent. It covers the immense area of 414,253 square miles, or 265,121,920 acres, being almost three times the size of Japan, which has a population of 46 millions of people, whereas not more than 500,000 people are living within the Murray Basin area. The Dividing Range, which runs approximately parallel to the coast, is generally between 2,200 and 5,000 feet high, but some of the peaks attain an altitude of considerably more than 6,000 feet, and the highest point, Mount Kosciusko, is 7,256 feet.

The effective catchment area of the Murray Basin (Plate 3) is shown by shaded lines, and comprises an area of 158,499 square miles, while no less than 255,754 square miles are regarded as absolutely non-contributing.

**Catchment
Area.**

In Queensland the catchment area is 104,525 square miles, and extends from the Condamine River in the east to the Paroo in the west, and its most northern point at the head of the Warrego is 250 miles from the New South Wales border. In New South Wales the area within the Murray Basin is 234,362 square miles and it embraces the whole of the State west of the Dividing Range, with the exception of a small area in the extreme north-west. With regard to Victoria, the basin

Plate 4.



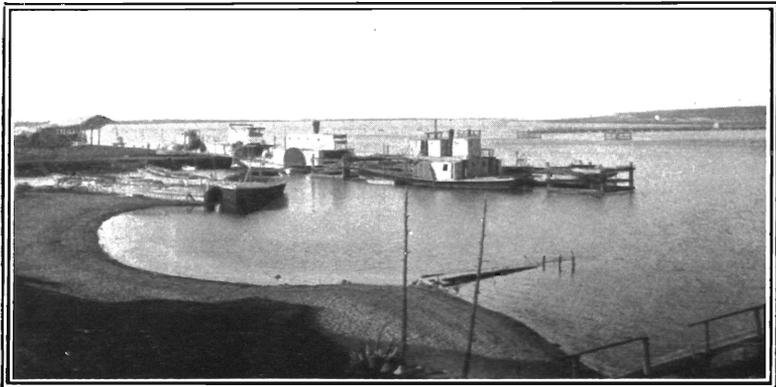
THE MURRAY RIVER AT MORGAN, S.A.

embraces considerably more than half of that State, and extends from the western boundary to the Indi River in the east.

The area of the Murray catchment within South Australia is about 24,000 square miles, and its contribution to the main stream may be regarded as a negligible quantity. The country, with the exception of a small area of river flats, is of poor quality with a very low rainfall, the record at Morgan (Plate 4) for a period of twenty-one years being an average of only 8.93 inches per annum. The Murray in South Australia has a very slight slope, and in many places the banks are wide apart, necessitating a very large volume of water to maintain navigation, even with the small steamers in use drawing 4 or 5 feet of water. The length of the Murray within the boundaries of South Australia is about 470 miles. The river enters Lake Alexandrina near the village of Wellington, the outlet being through the Goolwa and Coorong Channels which unite at Mundoo Island and form one channel to the sea.

Lakes Alexandrina and Albert (Plate 5) comprise an area of 288 square miles, the former being 224, and the latter 64 square miles. The country on the margin of the lakes is occupied in large blocks, and it is estimated that about 150,000 sheep are dependent on the waters of the lakes, so that the question of their freshness is important to the lake side owners. In

Plate 6.



GOOLWA HARBOUR S.A.

order to provide water for evaporating purposes over the large water surface, an annual volume of no less than 42,000,000,000 cubic feet are required, or a continuous flow of about 80,000 cubic feet per minute. South Australia contends that not only this volume lost by evaporation should be made good, but also that a sufficient quantity of water should be sent down the river channel to maintain a navigable depth and keep the lakes in a state of freshness.

MAP

OF

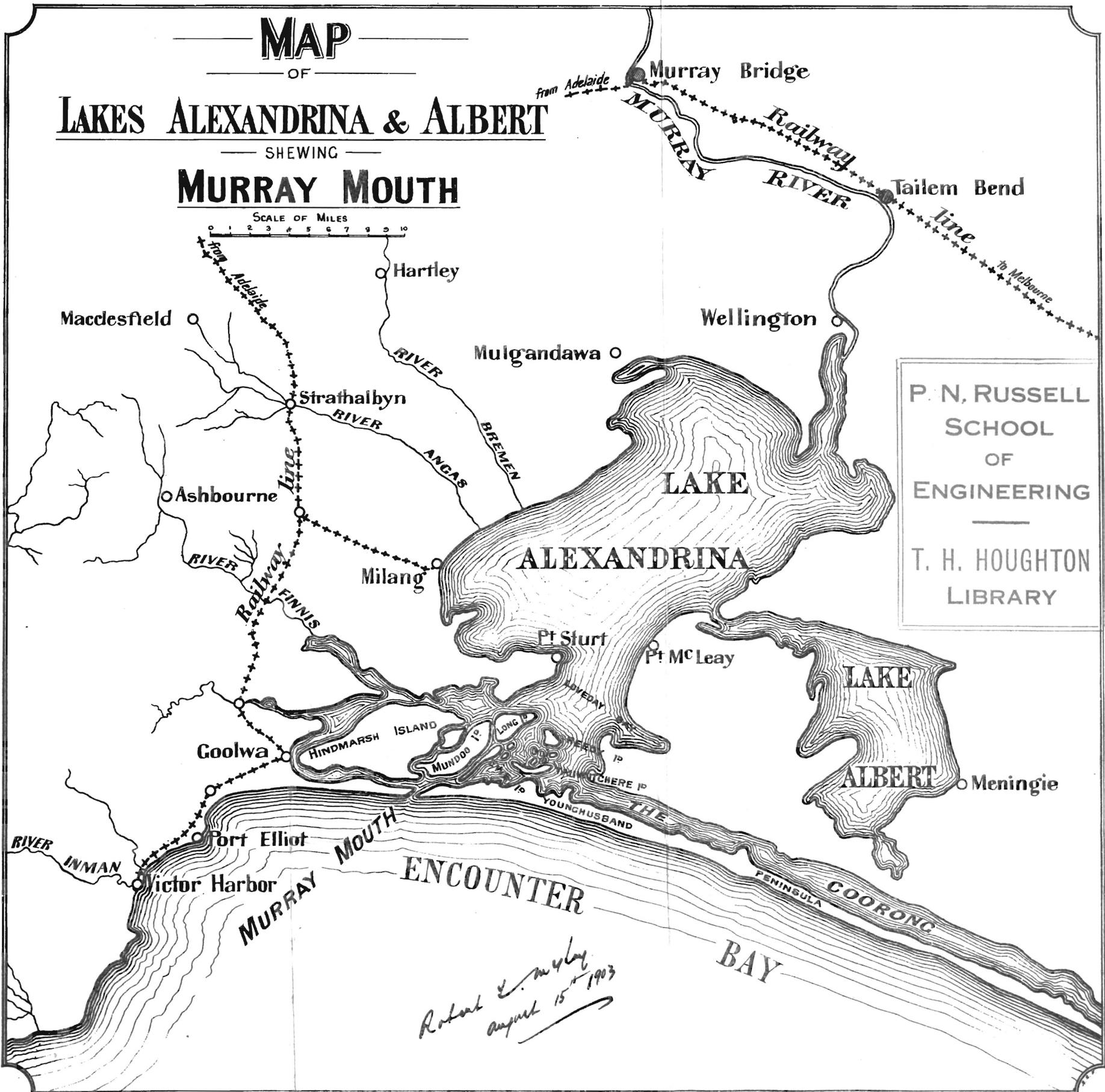
LAKES ALEXANDRINA & ALBERT

SHEWING

MURRAY MOUTH

SCALE OF MILES

0 1 2 3 4 5 6 7 8 9 10



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In 1902, owing to the drought, the volume passing down the Murray was not sufficient to overcome the tidal action, and the **Saltness of Lakes.** inrush of salt water through the Murray mouth. As a consequence, the lakes became saline. Salt-water fish made their appearance, and the reeds on the shores of the lake died. The lakeside owners were seriously inconvenienced by the failure of fresh water for their stock; to remedy this, wells were sunk, and it has recently been reported that excellent water was struck at depths ranging from 30 to 100 feet. Evidence was given before the recent inter-State Royal Commission by a number of witnesses as to the saline properties of the waters of the lakes, and statements were made that this was due to the diversions made by the upper riparian States. As a matter of fact the diversion of water has caused no appreciable diminution in the volume of the river, and it would have been more reasonable for the South Australians to have attributed the unprecedented low state of the Murray in 1902 to the long continued drought, and the absence of snow in any quantity on the mountains.

The Murray Mouth resembles many of our bar-bound coastal rivers, and proposals have been made from time to time with a **The Murray Mouth.** view of rendering it navigable. Sir John Coode, amongst others, reported on the question, and considered that the only reasonable prospect of success lay in the construction of two breakwaters running out from the shore, one on either side of the entrance. The cost of these works he estimated at about £2,000,000, and even with this large expenditure he was very doubtful of the success of the scheme. In heavy gales the waves break through the entrance from 15 to 20 feet high, and the sand bar is continually shifting its position. The past attitude of South Australia is somewhat inconsistent with the claims she makes at the present time, for with a navigable entrance, the lakes would have been as salt as the ocean, but as such is almost impracticable, it is now claimed that the lakes should be kept fresh by the waters of the Murray. The construction of a barrage at the mouth to exclude the salt water is estimated to cost £113,000.

On the shores of Encounter Bay and about twelve miles from the **Victor Harbour.** Murray mouth is the town of Port Victor (Plate 7), where a breakwater and Harbour Improvements have been made at a cost of £150,000, and a comparatively safe anchorage for vessels provided in ordinary weather. Owing to the fact that steamers cannot enter the Murray from the ocean, the cargo of the Murray steamers is transhipped at Goolwa, and carried by rail to Port Victor, and then put on board the ocean-going steamers. It is, therefore, not to be wondered at that efforts have been made to connect Goolwa with Port Victor, in order that there may be a

discharge direct from the Murray steamers into the ocean-going vessels. A canal between the two points mentioned could not be constructed

Plate 7.



PORT VICTOR, S.A.

under £500,000, which, with interest, maintenance, and working expenses, would mean an annual expenditure of about £25,000. A comparison of the results of the trade, even before the railways had tapped the rivers, shows that the highest record for exports from Port Victor in any one year was 34,000 bales of wool, so that the cost per bale would be nearly 15s. for these charges alone.

Plate 8.



THE MURRAY RIVER AT MURRAY BRIDGE, S.A.

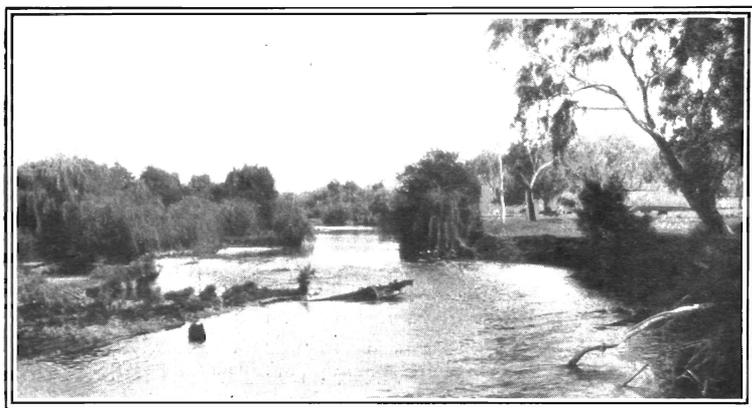
In January last a fish was caught at Murray Bridge (Plate 8), and the people were startled by the appearance of a previously unheard of

visitor. It was a tiny garfish, bringing a breezy suggestion of the ocean into the reaches of the Murray. It was stated that never before had a salt water fish penetrated so far into the Commonwealth, and it was looked upon as an evil messenger. Certainly, no fish previously caught in Australia attracted so much attention as this poor little garfish. Its capture was telegraphed to the innermost parts of the Commonwealth, and it was the subject of many leading articles in the South Australian Press. The *Sydney Morning Herald* not only honored it with a long obituary notice, but also gave it a leading article in one of its issues.

THE MURRAY RIVER.

The boundary between New South Wales and Victoria has been described as "a straight line drawn from Cape Howe to the nearest source of the Murray, and thence by the Southern boundary of that river to the eastern boundary of the province of South Australia." By reference to the map (Plate 3) it will be seen that the Umuralla Creek is nearer to Cape Howe than the Indi River

Plate 9.



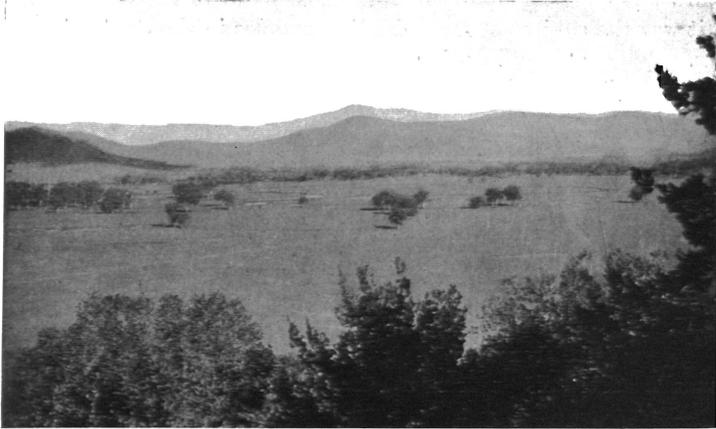
INDI RIVER, N.S.W.

and some authorities contend that the line to the Indi should have been drawn to the Umuralla Creek, and thence along the course of the Murrumbidgee, which is one of the tributaries of the Murray. This would, of course, have given to Victoria the whole of our Riverina country, and many legal gentlemen, residing across the Murray, consider that Riverina should belong to Victoria. These views, of course, are not shared by the lawyers of New South Wales. The Murray rises as the Indi, in the Snowy Mountains near Mount

Kosciusko (Plate 10) and flows northerly. At Bringenbrong it is joined by the Swampy Plain River, a stream of considerable importance. Between Bringenbrong and Jingellic the Murray receives the Tooma which rises in the Jagungal, Bogong and Dargal ranges, where the country is rugged and precipitous

Source of the
Murray.

Plate 10.



MOUNT KOSCIUSKO, AS SEEN FROM TOWONG STATION.

and heavily snowed for many months in the year. Towards Albury it is joined by the Mitta and Kiewa, and between Albury and Wentworth the affluents of the Murray are the Ovens, Goulburn, Campaspe and Loddon from the South, and the Murrumbidgee and Darling from the North. The fall of the river from Albury downwards varies from 9 to 4 inches per mile. From Wentworth, however, to Lake Alexandrina the fall is only 3 inches per mile.

In June, 1902, the writer accompanied the recent Inter-State Royal Commission in their tour of inspection of the Murray River. A start was made from Goolwa (Plate 6) in the commodious river steamer "Tarella." Passing Point Sturt on the left—a station owned by Mr. Angas, the famous cattle breeder—Milang, a small township on the shore of Lake Alexandrina, was next visited. Leaving the waters of Lake Alexandrina, and steaming up the Murray proper, the villages of Wellington, Murray Bridge, Mannum, and Blanchetown were passed in the order named. Owing to the low state of the river, the steamer had to be abandoned at the latter place, and the remainder of the journey accomplished by coach. The next township of importance was Morgan (Plate 4), which may be regarded as the centre of the lower Murray river-borne traffic. A large proportion of the produce carried by the river steamers is transhipped here, and sent by rail to Adelaide.

Some features of
the Murray.

After leaving Morgan, Overland Corner, a small village, was passed, and the Renmark Irrigation Colony was next visited, the change from the desolate mallee country passed through being very pleasant. The settlement is in a prosperous condition, and summer fruits, raisins, currants, sultanas, olives, citrus fruits, &c., are grown. The water is supplied from the Murray by means of pumping. The picture (Plate 11) shows an avenue of olives at Mr. Chaffey's, and Plate 12 an avenue at Colonel Morant's.

The value of citrus and dried fruits, and olive oil shows a steady yearly increase. The export in 1901 was £29,474, being an increase over the previous year of £8,542. As an evidence of the value of irrigation, it may be pointed out that Chowilla Station, adjoining Renmark, and containing 250,000 acres, was, at the time of the writer's visit, carrying only 5,000 sheep, whereas Renmark, with 3,000 acres under irrigated culture, maintains a prosperous population of 1,000 persons living under agreeable social conditions. "Chowilla" is by no means destitute of country which, under irrigation, might be as productive as Renmark. Plates 11, 12, and 13 convey some idea of the marvellous revolution wrought in the arid district of Renmark by irrigation. The latter plate shows one of the channels in Chaffey's

Plate 11.



OLIVE AVENUE AT MR. CHAFFEY'S, RENMARK, S.A.

orchard. The palms showing such vigorous growth have been planted on many of the channels throughout the settlement, and serve as breakwinds to protect the fruit, and as a check on evaporation of the channel contents.