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## THE ABORIGINAL FISHERIES AT BREWARRINA.

By R. H. MATHEWS, L.S.,

Associé étranger Soc. d'Anthrop. de Paris.

[With two Illustrations.]

[Read before the Royal Society of N. S. Wales, August 5, 1903]

THE town of Brewarrina is built upon the left bank of the Darling River, parish of Brewarrina, county of Clyde, New South Wales, and is at present the terminus of the railway into that district. Near the northwest extremity of the town, at a bend in the Darling River, there is a low bar of Desert Sandstone across the channel, forming a natural weir or dam when the river is low. Above the bar there is a long stretch of deep water, never known to go dry, called Gurrūnga by the natives. As soon as the water in the river rises to the level of the rocky bar, it flows over, and forms a series of shallow rapids for about a quarter of a mile, in which distance it is said to fall eleven feet. When the river is in flood, the channel is filled to a sufficient depth to allow flat-bottomed steamers and barges to pass over the rocks. These barges carry merchandise on the up journey, and wool and other produce on the downward trip.

In examining the channel of the river at the site of the rapids, we find evidence of the sandstone outcrop at this spot having been much wider and higher in ancient times than at present. All the way along the southern bank of the river from the present bar downward for about fifteen chains—and at a few places on the opposite bank—the Desert Sandstone is exposed. Here and there on the river floor, within the same distance, isolated masses of this rock, which have withstood the erosion of flood-waters,

are still standing. The average width of the bed of the river is about five chains at this place.

From these indications we may safely infer that the river, in the course of a long period, has cut its way through about fifteen chains of the Desert Sandstone, that is, from about the point *D* on the diagram upward to the existing bar. Mr. R. Daintree was the first to name rock of this description. Speaking of "horizontal beds of coarse grit and conglomerate," he adds, "I have called this upper conglomerate series 'Desert Sandstone,' from the sandy, barren character of its disintegrated soil, which makes the term particularly applicable. . . . The denudation of the Desert Sandstone since it became dry land, has been excessive."<sup>1</sup> Rev. J. E. Tenison-Woods,<sup>2</sup> in speaking of this kind of rock, says, "Wherever met with, it bears marks of being much denuded. Water seems easily to have broken it up. The age of the Desert Sandstone may be the equivalent of the Upper Cretaceous."

At the western extremity of the outcrop of Desert Sandstone, about the point *F* on my diagram, some schists are met with, for a description of which I will quote from the Report of Mr. E. F. Pittman, who has visited that district: "In the banks of the Darling, at the western end of the town of Brewarrina, Palæozoic slates and schists, with interbedded quartz veins, occur. These schists are inclined at a high angle, and are probably of the Upper Silurian age. These rocks in the river bank are overlaid by horizontal beds of Desert Sandstone, of the Upper Cretaceous age."<sup>3</sup>

During the progress of cutting out the river channel as above suggested, fragments of rock of various dimensions were worn off and broken up by the water, and formed into

<sup>1</sup> Quart. Journ. Geol. Soc., (London, 1872) Vol. xxviii., p. 275.

<sup>2</sup> "The Desert Sandstone"—Journ. Royal Society, N.S.W., Vol. xxii., pp. 291 and 296.

<sup>3</sup> Ann. Rep. Dept. Mines, N. S. Wales, 1902, p. 119.

boulders. After a long interval, the channel of the river at this spot became strewn with boulders of different sizes. At some time subsequent to this period, the aborigines availed themselves of this building material and erected those interesting structures called by the white population of the river "The Native Fisheries," but which are known to the blackfellows as "Ngünnhu."

Amongst other towns on the Darling River, I visited Brewarrina in 1901. The great drought was then at its worst, and the river had ceased to run, leaving the site of the aboriginal fisheries quite dry. I took advantage of this opportunity to make an accurate survey, with chain and compass, of the principal fish-pens still in existence.

Most of the aboriginal population of the district have died out, and the few blacks and half-castes who are left are settled upon an Aboriginal Station, under Government management, about six miles up the river from Brewarrina, where the aged people and children are fed and clothed at the expense of the State. Under these circumstances, and the natives being naturally an indolent race, they have allowed the fishing-grounds of their forefathers to get considerably out of repair, and many of them have been damaged by floods, or knocked down by steamers and barges navigating the river.

In the olden days when the natives were numerous, the fishing-pens were maintained in good working order, in anticipation of the spawning season and also of freshets in the river. At times when the stream was low, or the channel altogether dry, and the stone dykes were fully exposed, the men set to work and repaired such damage as might have been occasioned by trees and other debris carried down during floods. On such occasions new pens were sometimes added.

I will now endeavour to describe the fish-traps and their construction. The river-floor at this point consists of immense numbers of loose stones, ranging from twenty pounds to a hundred weight, with others of greater dimensions. The aboriginal builders collected large quantities of these stones and erected walls, in the way many of our farmers about Kiama used to build stone dykes or fences around their farms. These walls were erected in a substantial manner, being wider at the base, where also the larger stones were used, and tapering upward to the top. The stones were merely laid in position, without mortar or dressing of any kind, forming a structure sufficiently strong to resist the force of the current. The large stones used in the foundation or base of the wall were rolled into position, whilst the smaller ones were carried by the builders. Areas were enclosed in this manner, varying in dimensions from that of a small pond almost down to the size of a plunge bath, the walls of one enclosure being common to those around it, forming a labyrinth of inextricable windings. These enclosures were continued right across the channel from bank to bank, and occupied all the suitable portions of the river floor for about a quarter of a mile along its course. Some of the pens or traps were long and narrow, others nearly circular, whilst others were irregular in shape, according to the formation of the bed of the river, and the facilities for obtaining the heavy building material close at hand.

The level of the water was observed while the river was running, and owing to the unavoidable irregularities of the bed, the walls of some of the pens were built higher than others. Again, when the water was low, or during a small freshet, only a portion of the channel and the pens contained in it, could be utilized for fishing operations, whilst certain pens on higher ground could not be used at all, owing to

insufficiency of water. The average height of the walls varied from two to three feet. They were about eighteen inches wide at the base, and the top was surmounted by a single course of stones.

During the early spring months of the year, or at any time when there was a fresh in the river, the fish travelled up stream in immense numbers. The stone pens or traps had their open ends towards the direction from which the fish approached. The aboriginal fishers, men and women, were on the look out, and as soon as a sufficient number of the finny tribe had entered the labyrinth of traps, the openings were closed up by means of large stones which had been placed alongside ready for use. If the opening was too wide to be thus blocked up by stones, a number of natives posted themselves across it to prevent the egress of the fish. The natives next entered the pens and splashed the water with their hands or feet, thus frightening the fish into the smaller enclosures, where they were more easily caught. Any unusually large fishes which might be in the "haul," were killed as speedily as possible, because they at once commenced swallowing the smaller ones collected in the pens. These "big-fellow fish" were generally speared by the young men, as they first entered the enclosures, before they had time to do any damage.

It appears from the foregoing description that the fish, in coming up the river, were intercepted by the outliers or "wings" of this maze, which stretched from bank to bank; they entered the larger enclosures, from which they were chased into smaller and smaller pens, much in the way that sheep are driven into "catching-pens" at shearing time, or cattle into the "killing yard." In driving the fish through the different yards, some were killed by spear or club as opportunity offered, going along, but on arrival at the smallest pens all the fish were caught and killed. The

larger fish were speared, or killed by a club, but the smaller ones were caught by hand, the fisherman passing his finger through the gills and inserting a cord, on which he carried as many fish as could be dealt with in this manner. My old native informants told me that none were left in the yards, because if they got away they would warn all their fellow-fish not to go into such a trap in the future. One old man stated the same rule was followed in netting emus when he was a boy. Great care was taken to prevent the escape of an emu from the net, lest he should tell other birds about the ingenuity of their enemies.

Each division of the tribe, and the families composing it, had their own allotted portion of the fishing grounds, and every pen or trap had a name by which it was known and spoken of among the people. The following are a few of these aboriginal names:—Mirrā'gan, Gū'na, Thau'ia, Il'prūnya, Buddhau'inga, Giwirri, Ngiddēri, Gūmboar'o, Mu'arba, Thulūr'digana, Būragūman, Būrugūngal', Dhau'danbaia, Mogēl', Goāra, Wirridung-kunya, Wāgurma, Bau'andanna. In the lowest portion of the river bed, where the water has the most fall, and consequently runs the swiftest over the rapids, is called by the natives "Wirruwirumba." Large rock masses, projecting high above the water, occupying their natural, undisturbed position in the channel, also had native names by which they were easily distinguished. The most remarkable of these large blocks of Desert Sandstone, which are chiefly near the southern bank of the river, are represented in their correct positions on the accompanying plan and their names given in the descriptive letter-press.

To enable the fishing operations to be proceeded with, it was necessary that the walls of the pens should be a little way out of the water, because when the flood rose above the tops of the traps, the fish could easily swim over them.

But when the pens in the lower portions of the river floor were submerged, those situated on a higher level, referred to in an earlier paragraph, could be availed of. When the river was falling these conditions were reversed—when the higher yards became dry, the lower ones were resorted to. In very uneven portions of the river bed there were several grades, to meet the exigencies of the rise and fall of the water.

The water of the Darling is never clear, but always of a greyish hue, owing to the light-coloured clays along its banks. This has given it the name, among poets and novelists, of "The old, grey river!" During long periods of dry weather, however, a good deal of the clayey matter held in solution sinks to the bottom and the stagnant water becomes somewhat clearer. In times of flood the water is muddy and of a slightly reddish shade, due to the storm water draining in from surface soils of that colour. Owing to this sudden change in the character of the liquid, the fish often flee before the advancing turbid stream, which appears to nauseate them. When such a fish-laden current reached the Ngūnnhu at Brewarrina, the aborigines had the "up-stream" ends of their traps ready for action.

The Brewarrina fishing pens were situated within the territory of the Ngēumba tribe, who always mustered there in considerable numbers in the fishing season, or at other times when fish were expected to be plentiful. The same people did not remain there all the time, but when certain families moved away into the back country to hunt for kangaroos and other game, other families came in to the river, and participated in the piscatorial harvest. Although the fishing grounds were apportioned among specified people, as already stated, the ownership was not of the exclusive character existing among Europeans. For example, if a man were not present, his "claim" might be

worked by his relatives, such as uncles, brothers, brothers-in-law, nephews, or the like. Generally speaking, there were some straggling members of the tribe located about the fishing grounds all the year round.

The fishing season was sometimes made the occasion of inviting neighbouring tribes to join in their great coroborees, initiation ceremonies, or meetings for trade and barter. The people camped on either side or both sides of the river, because when the water was low enough to admit of the traps being used, it was quite easy for those who wished to visit friends on the opposite shore, to wade across the rocky bar.

The principal fish which formed the subject of operations at the traps were Murray cod, black bream, and yellow bellies. The black bream was the favourite fish among the aborigines as an article of food. The cod fish, so the natives told me, ramble down as well as up stream, and were caught in the pens at any time.

In the "History of the Fisheries of New South Wales," by Lindsay G. Thompson, published by authority of the New South Wales Commissioners for the World's Columbian Exposition, Chicago, 1893, an article was furnished by Mr. E. G. W. Palmer, in which at pp. 96–98, he briefly refers to the Brewarrina Fishery, and gives a photographic view of a portion of the structure. He erroneously describes the rocky bar as a "granitic dyke."

#### EXPLANATION OF ILLUSTRATIONS.

No. 1. *Diagram.*—The accompanying plan has been prepared by me from a detail survey which I made about a year and a half ago, and shews twelve chains of the channel of the Darling River, representing the dykes and pens still existing on the best preserved portion of the ancient fishing locality. Extending upward from A, see diagram, there are about eight chains more of the river floor containing

fragments of old fishing yards in different places; but they are of less extent and more disconnected than those I have selected for reproduction.

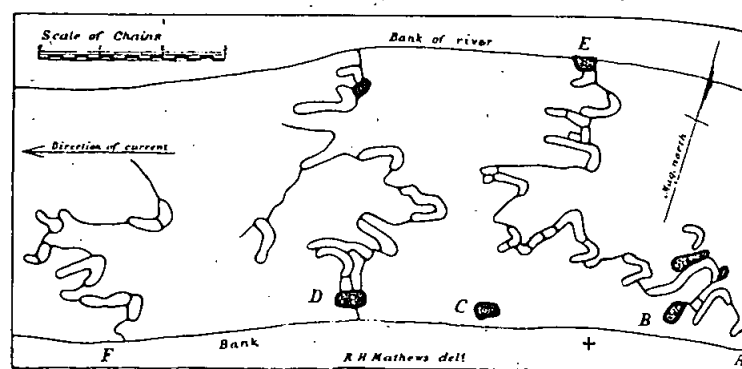


Diagram of the Ngūnnhu or Native Fish Traps in the Darling River at Brewarrina.

There is now a magnificent high-level bridge over the Darling about a mile above the fishery, but prior to its erection, loaded drays, travelling stock, and general traffic used to cross the river on the rocky bar already described, in consequence of which most of the pens in the vicinity of the bar have become dilapidated beyond recognition. In midstream, just below and adjoining the bar, is a small, low, rocky island, on which trees formerly grew; as evidenced by a few stumps still remaining. Within the recollection of the present natives, and also of old residents among the white people, the area of this island is less now than it was thirty or forty years ago, owing to the trampling of cattle and other stock. Between this island and the northern bank of the river, but somewhat lower down stream, are two other insular patches, but much smaller, with a few trees growing upon them. The oldest of the aborigines told me that the bar itself, and the margins of the little islands, were studded with catching pens in the olden times.

Near the southern bank, and at a few other places in the bed of the river, there still remain some masses of original rock which have withstood the ravages of time, and are shown in solid black on the diagram. The following are the aboriginal names of most of them:—B, see diagram, is called Muar; C, Kullūr; D, Dherraginni; and E, on the northern shore, is known as Kirragurra.

The blank spaces on the diagram were in the olden days studded with fishing pens, of which the wreckage is visible in many places in the shape of scattered boulders and indistinct outlines of former enclosures. But the whole of the river floor was not occupied with the maze of traps. A waterway had to be left for the fish to travel up to the catching pens of families located higher up-stream, and for this purpose the most uneven portions of the bottom were selected because the least suitable for building upon.

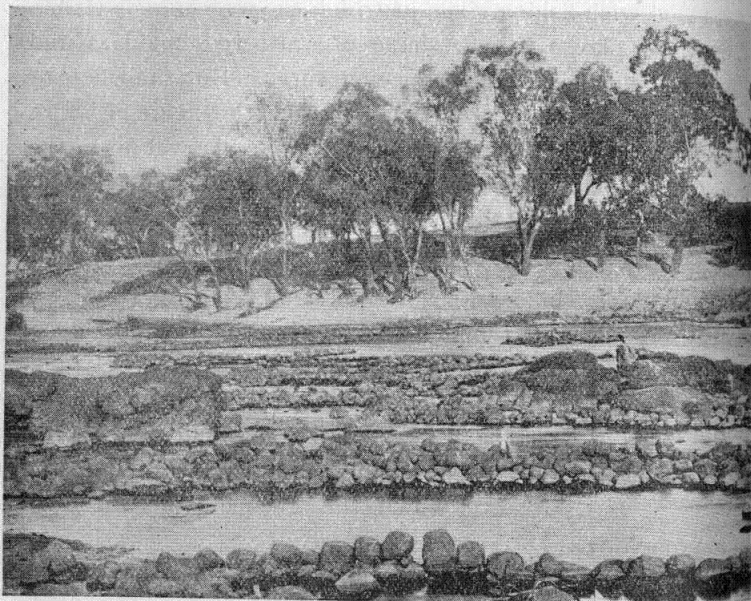
The black, sinuous lines drawn upon the diagram represent the walls of the different pens, and groups of pens, with the "wings" or outlying walls which guide the fish into the enclosures. I have not shewn the openings into the traps, because they were sometimes made in one part of the wall, and sometimes in another, according to the part of the stream in which the "school" of fish were approaching.

At the point marked with a cross on the diagram, on the southern bank, which is rocky, between C and A there are about two dozen grinding places, worn in the rocks by the natives sharpening their stone hatchets. About three chains eastward from A there are a number of similar grinding places.

No. 2. *Photographic View*.—The photograph from which this zinc-plate has been prepared was taken from some high ground on the left bank of the Darling River a few yards easterly from the point marked A on the diagram, and faces



downward and diagonally across the channel, in a generally northwesterly direction, taking in a perspective view of most of the fishing pens shown on the diagram. The large horizontal rock on the left-hand side of the photograph is the same as the rock marked *B* on the diagram; and the rocky mass with an uneven top on the right-hand side of the picture corresponds to the long rock appearing in black on the diagram, due north of the rock at *B*.



Photographic View of the Native Fish Traps in the Darling River at Brewarrina.

The mark  $\times$ , visible on one of the trees on the opposite bank, in the middle of the picture, indicates the flood-level of the Darling River.

It is hoped that the two illustrations now supplied—the ground plan and the perspective view—together with the descriptive letterpress, will enable the reader to form a more realistic conception of the aboriginal fisheries at Brewarrina than has been possible hitherto.

## THE SEPARATION OF IRON FROM NICKEL AND COBALT BY LEAD OXIDE (FIELD'S METHOD).

By T. H. LABY, Junior Demonstrator of Chemistry,  
University of Sydney.

[Communicated by Professor LIVERSIDGE, M.A., LL.D., F.R.S.]

[Read before the Royal Society of N. S. Wales, September 2, 1903.]

### *Review of Methods for the Separation of Iron from Nickel and Cobalt.*

#### 1. Ammonium Hydrate and Chloride.

The precipitation of ferric salts by ammonium hydrate in the presence of ammonium chloride gives an incomplete separation—according to Moore<sup>1</sup> an absolutely worthless one. No experimental work on the reprecipitations necessary for accuracy was found. Fresenius states three to be necessary. Baumhauer<sup>2</sup> is said to have found that ferric hydrate may occlude 27% of nickel and 48% of cobalt.

#### 2. Ammonium Carbonate (Schwarzenberg<sup>3</sup>).

To the solution of the chlorides, containing ammonium chloride equal to twenty times the weight of the oxide of nickel present ammonium carbonate is added to a point specified in Schwarzenberg's paper, and quoted by Fresenius. The success of the method depends on striking a point difficult to ascertain. The method, however, is recommended by Fresenius and others. The writer in an analysis of a meteoric iron, found it to be a long and tedious separation; and the amount of nickel found being lower than by Field's method, partly owing to a slight loss in the pre-

<sup>1</sup> Chemical News, 1892, LXV., p. 75.

<sup>2</sup> Archives fur Néerlandaises, 1870, Vol. VI.—(Reference not verified.)

<sup>3</sup> Liebig's Annal. XLVII., p. 216; also Chem. Gaz., 1856.