

I first made the acquaintance of this insect in the summer of 1873-74, at Clyde, in Central Otago, where it was looked upon as a new-comer. Mr. Potts observed it first in Canterbury in 1880. Since then it has become common, and is often brought to me to name, but always as an insect not seen before.

I think, therefore, that the species has been unintentionally introduced—into Auckland from Sydney, and into Otago from Tasmania or Victoria—at the time of the commencement of the gold-diggings, when large quantities of hay were brought to Otago from Australia. However, according to Mr. Wood Mason, New Zealand specimens have the reticulation of the tegmina less dense than those from Australia.

It is remarkable that this insect should have increased so much in numbers while the *Phasmas*, which used to be common, appear to have been exterminated in the neighbourhood of Christchurch by the introduced birds.

Tenodera intermedia was described in 1870 from a single female specimen in the Paris Museum, which was said to have come from Auckland; but no other specimen has been found in New Zealand, and it is hardly possible that so large an insect—more than 3in. long—should have escaped the keen eyes of Mr. Colenso and other collectors. I think, therefore, that we may suspect the correctness of the locality of the type specimen. This species may be easily distinguished from the last by the shape of the pronotum, which is narrow, the sides nearly parallel behind, slightly widening over the legs, and then narrowing towards the anterior end, which is rounded.

ART. XVI.—*On Two New Globe-fish.*

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Plates XIV., XV.

BEFORE proceeding with the descriptions of the two globe-fish, it may not be out of place to give a short epitome of the present varieties of the group Tetrodontina so far proved to inhabit the waters surrounding New Zealand, and to write shortly on the interesting facts evolved concerning the dermo-spinous development of the group generally, and its use in definition and analyses of genera and species and their analogies.

Of the family Gymnodontes, group Tetrodontina, we have now found indigenous *Tetrodon richiei*, the two I hereafter describe (*T. gillbanksii* and *T. cheesemani*), and *Dicotylichthys jaculiferus*.

T. richiei is very numerous on the west coast of the South Island, the sweeping of a seine-net on the beach frequently drawing them up in hundreds, quite vitiating the air on such occasions with the nauseous and unpleasant odour appertaining to this species. As far as my inquiries extend, it appears to be of much less frequent occurrence from Cook Strait round the west coast of the North Island. I have often captured them on a light line when fishing for the so-called "herring" (*Agonostoma*) in the Hokitika River. The spines so freely and densely covering its body are always prominent and exposed, and may be described as short and bristly. Dr. Günther's catalogue description states the caudal peduncle is smooth, but as a more general rule I have found that the minute spines are present thereupon. I have had a long acquaintance with the Tasmanian variety, *T. hamiltonii*, having caught them in that colony in a small trawl-net, with the seine- and shrimp-net, and on the line. In the latter description of fishing they used to be a constant source of annoyance to those anglers who frequented the Tamar and neighbouring portions of the North and South Esk Rivers at Launceston in order to take the mullet (*Agonostoma* and *Mugil*) and the fish there designated "salmon-trout" (*Arripis*), but in this I understand their office has been usurped by the acclimatised *Tinca vulgaris*. I invariably found *T. hamiltonii* perfectly spineless, either externally or *in situ*, and that they had practically no capacity for distension of the body, nor had they any lateral fold. If actually the same fish, for such last reason it should be removed from the sub-genus *Gastrophysus*. This fish is very poisonous, and has caused loss of life when eaten, to my own knowledge.

It is undoubtedly unsafe to use any of the Tetrodons or Diodons for food, as they seem to be invariably poisonous, though their generally repulsive appearance protects them from such use in a great measure.

The variety of spines throughout the Tetrodontina run in gradations from plain striated or granulated scutes with scarcely any central prominence, and planted on the surface of the epidermis, to complicated or simple bulbous-rooted spines, either placed on the surface or wholly or partially imbedded in the dermis in grooves, pores, or fossæ, and of different lengths, shapes, and thickness, from that of a dagger-blade in miniature to the thinness of a hair, being either permanently rigid or capable of voluntary ejection or erection, and occurring in bands, patches, or all over the fish. In this

variation they form a valuable adjunct to other features appertaining to the group in adjusting a species in its systematic regularity.

Order PLECTOGNATHI.

Group TETRODONTINA.

Family GYMNODONTES.

Genus *Tetrodon*.

Sub-genus CRAYRACION.

T. gillbanksii, sp. nov.

I obtained my first view of this fish when fishing off the wreck of the "Hawea," at Moturoa, Taranaki, in January, 1895, an unknown blue-spotted fish several times following the bait to the surface without being hooked. On the 26th March of the same year a fine specimen was washed up alive on the beach at the same place, and was kindly sent me in a bucket of salt-water by Mr. Gillbanks, then foreman of works at the mole. This is the specimen now described, and reported by me in the *Taranaki Herald* a day or two afterwards. Since that time I have obtained another, but smaller, specimen in perfect condition (this I forward to the Wellington Museum), and have had a couple of "remains" brought me, one of which, consisting of the partially-decomposed skin only, must have been from a fish at least 14in. in length.

Strange to say, all that have passed through my hands have had a small punctured wound just before the root of the pectoral fin and on the edge of the gill-opening, perhaps the work of a small octopus.

The whole body, with the exception of the little "pads" (muscular) at the bases of the dorsal and anal fins, is uniformly covered with spines, which are much longer and stouter on the belly and lower portions of the sides. These spines are all retractile into fossæ, and are supplied with an oval bead-like or bulbous appendage adherent to their external sides and near the tips thereof. This bead-like appendage, when the spines are fully-exposed, is capable of being stretched or drawn down, thereby fully uncovering the points, and, when the spines are retracted into the fossæ, forming a bead-like prominence at the mouths thereof. They are much larger and pure enamel-white on the lower sides and belly, but quite black on the upper sides, the tail, and the back, where they become smaller in regular order according to their distance from the abdomen. When fully exposed all the spines show a black skin surrounding their shafts. The spine *in situ* and exposed is delineated in enlarged drawing (Plate XIV.).

The mouth is rather smaller in proportion than such

feature in other genera. Eyes are of medium size, the distance *en profile* from the extreme tip of the snout to the anterior margin of the orbit being more than twice the diameter of the orbit. The nostrils are a single aperture on each side, two-lipped, the lips rising from the base with merely a suspicion of a tube. Height of the branchial orifice equals profile distance from centre of nostril to end of snout. Distance from tip of snout to rearmost upper horn of branchial aperture is contained more than three times in total length to root of caudal. The vertical from anterior origin of dorsal falls in advance of origin of anal, whilst vertical from posterior termination of base of dorsal cuts median line of base of anal. Length of base of dorsal equals least depth of body at origin of caudal, and length of base of anal is an eighth less than that of dorsal. Inclusive of soft pad at foot, the height of dorsal exceeds that of anal by two-fifteenths. Basal termini of anal and dorsal are respectively distant from origin of caudal their own free heights. These two fins are fat and fleshy. Pectorals are broad and short, in extreme length equalling the basal length of anal. Extreme length of caudal equals distance between centre of orbit and superior extremity of "horn" of branchial orifice, or also distance between termini of bases of anal and caudal. Vertical of posterior margin of pectoral is a trifle less than the median line between tip of snout and origin of free portion of caudal. There was no fold whatever along lower side of fish.

Fin-ray formulæ: D., 15 (first very short); P., 14; A., 14; C., 9. Total length of fish, 8.5in. Total depth (immediately after death, before tissues were contracted by immersion in alcohol and glycerine, and when the inflation had subsided); 3.5in. Height of dorsal (free portion), 1.16in. Height of dorsal (inclusive of pad), 1.4in. Width at base of dorsal (free part), 0.7in. Height of anal (free part), 0.96in. Height of anal (inclusive of pad), 1.1in. Width of base of anal, 0.8in. Extreme length of caudal, 1.45in. Extreme spread of caudal, 2.7in. Extreme length of pectoral, 0.8in. Extreme spread of pectoral, 1.6in. Extreme diameter of orbit, 0.35in. Width of branchial aperture, 0.45in. Least depth of body at origin of caudal, 0.7in.

Top of head rather broad and flattened, as is the anterior part of back, getting more rounded towards origin of dorsal. The interorbital space almost equals the distance between superior margin of branchial orifice and posterior edge of orbit, and about equals height of free portion of dorsal. Belly very rounded, sides flattening a little towards tail, but keeping fairly plump, which last term decidedly indicates the whole appearance of the fish when alive and in a quiescent state.

When inflated, for which the capacity existed to a very considerable extent over the chin, cheeks, throat, abdomen, and sides, the spines were all forced into full prominence. It seemed to distend itself with both air and water, which were ejected with considerable force when the fish was in full vigour.

In life and for some little time after death the fish was a brilliant and striking object, in consequence of the vividness of its coloration, which was as follows: Ground-colour of top and front of head, back, and sides, and on to origin of caudal fin, a rich dark purple-brown, lightening in tint towards the lower surface, and thence changing into a brownish hue. The whole of the body covered with sharply-defined markings, small, circular, and more numerous on the front and top of head and fore part of back, gradually enlarging as they proceed down the sides of cheeks and body; towards the root of the tail again getting much smaller. Towards the lower sides and abdominal surface the shape of the spots changes gradually to oval, and they increase in size very much. These spots on the head, cheeks, back, and upper sides were of a light-blue colour, those towards the lower sides and on the abdominal surface more or less white. Over the abdomen the peculiar pure enamel-white bead-like processes were closely scattered and very prominent. The other portions of the surface had a more widely-scattered black punctured appearance, caused by the other beads on the spines before referred to, but which have hardly any prominence. Pectoral fins of an orange tint. Dorsal and anal red, more or less margined with yellow. Caudal red, lightening towards free margin. Lips light-red. Irides yellow. Tints soon became much duller after death, and when immersed in the preservative the rich dark purple-brown changed to black, whilst the blue-coloured spots faded.

The specimen I send for the Wellington Museum died with its spines partly protruded.

The second species of *Tetrodon* I have the pleasure of noting was also found washed up on the beach at Moturoa, on the 11th May, 1896, by Messrs. James, Reilly, and Pearn, fishermen, who kindly forwarded it to me. It may yet prove to be similar to one obtained about a year ago at Tauranga and sent to Mr. Cheeseman, of the Auckland Museum, but which was not, nor has it yet been, I believe, described. I saw this fish in its glass jar in the Museum referred to at the end of last year, but my casual view was not sufficient to make its identity a certainty. If it proves so it will be a confirmation of its permanent occurrence on our coasts—finding it in localities so far apart. I propose that the specific

name of *cheesemani* be given it. This will identify it if future inquiry defines it to be the same, and, if not, it will be a further small tribute to so record the name of an earnest and assiduous worker in the cause of science.

Group TETRODONTINA.

Genus *Tetrodon*.

Sub-genus GASTROPHYSUS.

T. cheesemani, sp. nov.

This fish is also of robust form, though it differs very much in its proportions from the last, the body being more elongated, though the head is more pronounced. The profile of front of face rises rapidly to opposite the nostrils, whence it obtusely runs back in an almost flat line to behind the vertical over rear of orbit, thence it gently curves to midway between this station and origin of dorsal, falling gently to such origin. Between the dorsal and origin of caudal profile view gives an idea of slenderness not borne out in fact; as that part, from a dorsal aspect, is seen to be widened considerably, there being quite a depression along the median line (but this is lost on contraction after immersion in spirit). The top of the head and interorbital space are almost flat and quite wide, and the anterior part of the back keeps like this, with but slight transverse convexity for some distance. The sides and cheeks are flattened. The lower part of each side of the body from the chin along under the cheeks and thence on towards the tail has a very strongly-marked ridge, angle, or keel, which forms a striking delimitation between the silvery lustre of the sides and the plain dead-white of the lower surface. The ridge or keeled projection much increases the lateral stoutness, and gives a very flattened appearance to the ventral aspect of the fish—in fact, it has what the nautical designer would term a “very hard bilge.” From its running, though in a lessened altitude, round the chin it gives greater prominence than usual to such feature. This fish though capable of considerable distension of its skin, has not, such capacity to the same extent as the first-described *Tetrodon*, as in this instance it is confined to the skin of the throat and belly only. These parts are armed with fine short spines set in close and parallel rows in furrows running from the chin backwards. Between such furrows the whole of the skin of the localities named is divided into peculiar little flat-topped areas, oblong-rectangular and ovate in shape, and of enamel-white colour, running in regular rotation, the interspaces, of course, being more pronounced if the skin thereabout be distended. To the naked eye it resembles a

mass of minute mosaic-work; under the magnifying glass it has the appearance of the stomach-lining of some herbivorous animals.

This part, so spined and configured, is very distinctly divided from the rest of the lower surface, its margins being very abruptly and strongly defined. The remainder of the epidermis of the fish is perfectly free from spines, either exposed or hidden, except a patch covering the greater part of the interorbital space and fore part of the back, extending from thence towards the dorsal for a short distance in a triangular shape (the apex pointing rearward), and thence in a single row, ending near the dorsal with a slight widening in the pattern. These spines are small, weak, short, and exposed, very much smaller and finer than those on the belly, and with points inclined backward. The nose, cheeks, sides, back, and remainder of the under-surface are covered with skin smooth as satin, on the back and sides resembling that of the elephant-fish (*Callorhynchus*).

The anterior radices of the dorsal and anal fins commence in the same vertical plane, and posterior radices terminate in the same relationship. They are both furnished with and rise from a considerable muscular base, and are (with the caudal fin) of very fleshy nature. They are of even altitude, and agree in free altitude with the upper and lower free lobes of the caudal fin. The pectoral fins the birds had destroyed. The caudal fin is large and broad, margin much rounded. The nostrils are formed by a low semi-spherical tubercle partially sunk in a sulcus, with two apertures in each, the anterior one rounded, the posterior one elongated. At the rear of each sulcus is a crescent-shaped little trench the posterior edge of which is crenulated. The nostrils are situated much closer to the orbit than to end of snout.

One eye was also destroyed by the birds; the remaining one had a silvery iris. The eye is comparatively large. The orbits are partially encircled by an extension of the lateral line, the lower limb of which extends along the cheeks well on under them towards and round the end of the snout, the upper limb running from the angle of divergence from the lateral line directly upwards, and then partly along top of head on each side, then down and between nostril and eye till it meets lower line. Another branch of the line diverges from that previously described, running down the sides of cheeks, and one crosses the back of the head. The lateral line itself runs in a wide angle from the first-described divergence high up the side, having another small branch as an offset from its lower side over origin of pectorals; from junction with this last small branch it curves still higher on to back, then follows along upper side for some distance, then

falls in a rapid slope to near the lower edge of sides, whence it again rises slightly and runs on to tail, being well marked for some distance along the caudal-fin membrane.

Fin-ray formulæ: D., 12; anal, 11; caudal, 10. Head is to body and tail as 4 is to 15. Head is to total length (to extreme margin of caudal) as 5 is to 21.

Colour of back and upper sides a rich plumbeous-green with silky reflections; sides of bright metallic silvery lustre; anal, dorsal, and caudal fins dull-yellow, darkening more or less to reddish-orange on some of the rays, margined with black, but terminating on their extreme borders with more or less opaque milk-white.

The mouth was rather larger and teeth stronger than those generally appertaining to the genus, that portion of the upper teeth nearest the division between same being distinctly thickened and rounded.

Total length of fish (extremity of snout to margin of caudal), 11.25in. Length of fish from extremity of snout to origin of caudal, 9.4in. Length from extremity of snout to gill-opening, 2.6in. Diameter of orbit, 0.6in. Length, extremity of snout to vertical from origin of dorsal fin, 6.9in. Greatest depth of body with stomach in normal condition, 3.5in. Median heights of free portions of dorsal, anal, and caudal fins, 1.3in.

The length of the head equals the vertical depth between the fin-ray origin of the dorsal and anal fins, and is much less than the full expanded width of the caudal fin. The shortness of the head as compared with the distance from same to dorsal, or with the head and body length or total length, is a considerable specific feature in distinguishing this from others so far described. The anal orifice is placed some distance in front of the origin of anal fin.

Decomposition proceeded very quickly with this fish after it was obtained, although it was perfectly fresh when brought to me, the skin being very tender. Perhaps this was hastened by the birds breaking into the fish through the gill-openings. Further decomposition was checked by immersion in strong alcohol, but this had the effect of considerably shrinking and distorting the specimen. It tightened up the peculiar mosaic-like development of the abdomen, causing the little spines to be almost completely hidden.
