The radium-emanation content of the water taken actually from the well-pipe was in this case 135·5. These numbers show very conclusively how marked is the diminution of mortality with recession from the well; and, put another way, there is a strong correspondence between the number of dead eggs and the radium emanation. Thus, taking on the one hand the number of dead eggs in the top box as $100x$ (x, of course, then equals 66·7) and the radium-emanation content of the top box as $100y$ (then y is 1·26), we have the following correspondences :—

	Percentage of Dead Eggs.	Radium Emanation.
First pair of boxes	$100x$	$100y$
Second „	$79x$	$88y$
Third „	$69x$	$75y$
Fourth „	$70x$	$66y$
Fifth „	$48x$	$55y$

It is only right to add that these figures do not represent in any way the present practice at the hatchery. It was known that the mortality would be high, though the cause was not known; and it was to ascertain the cause that so large a number of eggs were sacrificed.

The figures with regard to blue swelling as it subsequently developed in these boxes, and to gas content, are given in the paper dealing with the dissolved gases (*loc. cit.*); but, even if death in maturer fish can be ascribed to an excess of gas, which to us does not yet appear to be certain, it is difficult to apply the theory of Marsh and Goreham to the mortality in eggs or to blue swelling.

Art. XVI.—*On an Isopod inhabiting Ants' Nests in New Zealand.*

By Charles Chilton, M.A., D.Sc., F.L.S.

[*Read before the Philosophical Institute of Canterbury, 3rd November*, 1909.]

It has long been known that an isopod, *Platyarthrus hoffmannseggii*, Brandt, is found associated with several species of ants in England and Europe. It has been described by Bate and Westwood,* Schoebl,† Webb and Sillem,‡ and others. Lord Avebury§ has also published the result of his observations and experiments upon it, and has suggested that it acts as a scavenger in the ants' nest.

When I was preparing my paper on the terrestrial *Isopoda* of New Zealand‖ in 1900, I heard from Mr. W. W. Smith that he had found two specimens of an isopod supposed to belong to the genus *Platyarthrus* in ants' nests in New Zealand, and that these had been forwarded along with the ants to specialists in Europe. My efforts to trace these specimens were

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* "British Sessile-eyed Crustacea," II, p. 464.
† Sitzungsb. d. k. Akad. d. W. math. naturw. Cl. xl Bd., No. 9, 1860, p. 279.
‡ "The British Woodlice," 1906, p. 30.
§ "Ants, Bees, and Wasps," 16th edition, 1902, pp. 75, 90, and 407.
‖ Trans. Linn. Soc., 2nd ser., Zool., vol. viii, p. 100.

unsuccessful, and at that time I could merely note their occurrence in ants' nests. In 1902 Mr. J. MacMahon sent me numerous specimens of an isopod found in association with the nests of ants in the Rai Valley, in Marlborough, and later on Mr. Smith sent me similar specimens from New Plymouth. Although these specimens were undoubtedly associated with the ants, it was not quite certain that they were habitual guests in the nests, and I therefore waited for further evidence. Recently, however, Mr. Smith has found other specimens undoubtedly living in the ants' nests,* and associated with two species of ants—viz., *Amblyopone cephalotes*, Smith, and *Huberia striata*, Smith; and I am therefore now able to describe the isopod. It proves to belong not to *Platyarthrus*, but to *Trichoniscus;* it thus belongs to a different family of terrestrial isopods, and it is interesting to note that we have here the same habit of life arising independently in two quite different isopods. It is rather larger than *Platyarthrus hoffmannseggii*, being about 5 mm. in length, and, though very much lighter in colour than the ordinary terrestrial *Isopoda*, it is not quite white, but is generally marked with bands or patches of pale brown on a white ground. Moreover, it is not blind, but possesses fairly perfect eyes, provided with, apparently, the normal amount of pigment. The description of the species is given below.

Trichoniscus commensalis, sp. nov.

Body rather broadly oval, fairly convex, pleon not abruptly narrower than the peræon; whole dorsal surface thickly covered with spiny tubercles, which are arranged more or less regularly in transverse rows—viz., one row along the posterior margin of each segment, and two or three much more irregular rows on the anterior part of each segment. In the pleon there is a fairly well-marked row along the posterior margin of the third segment, the other portions of the dorsal surface of the pleon usually bearing only minute spines.

First segment of peræon the longest, and produced into two rounded lobes reaching as far as the eyes; the last segment of the peræon with the postero-lateral angles produced so as to include the first three segments of the pleon, and to reach almost to the end of the epimera of the 3rd segment; in the pleon the 3rd, 4th, and 5th segments bear fairly well-developed epimeral portions. Terminal segment with the sides concave, the angles rounded, posterior margin straight or very slightly convex and bearing four small spines.

Eyes fairly well pigmented, formed of three ocelli, fairly close together.

Antennæ stout, especially the penultimate segment of the peduncle, which is half as broad as long, the last segment longer than the preceding, and bearing fine setæ on the outer side and roughened tubercles on the inner; the flagellum as long as the last segment of the peduncle, composed of five joints, the last bearing a pencil of fine hairs. The uropoda fairly stout, outer branch stouter but not much longer than the inner, both covered with fine setæ and bearing a tuft of longer setæ at the extremity. In the last pair of legs the ischium is produced on the outer side into a prominent triangular process or plate bearing one or two stout setæ.

Colour white with pale-brown markings, usually more or less arranged in longitudinal lines; the colour, however, varies very considerably, some

* Mr. Smith says that on one occasion "the ants were in the act of carrying off the specimens when I took them from them."

specimens having the dorsal surface almost wholly covered with brown markings.

Length, 5 mm.; breadth, 2 mm.

Hab.—New Plymouth and Mount Egmont, in nests of *Amblyopone cephalotes* and *Huberia striata* (W. W. Smith); Rai Valley, in nests of ants (J. MacMahon). Probably widely distributed in the North Island and in the north-western portion of the South Island.

The specimens from Greymouth collected by Mr. R. Helms, which I had previously referred with hesitation to *T. otakensis*,* belong to the present species. I have specimens also from Swanson, Auckland (H. Suter), and one from Kapiti Island (E. A. Newson). The last specimen is much browner than those actually taken in ants' nests by Mr. Smith and Mr. MacMahon, and it is possible that it was not living in association with ants. There is the same doubt with regard to the Greymouth and Auckland specimens.

Art. XVII.—*The Cam-lever Balance.*

By J. Clement Cuff.

[*Read before the Auckland Institute, 22nd November*, 1909.]

"Cam-lever balance" is the name given by the author to a modification of the bent-lever balance whereby the scale becomes regular throughout its whole length.

The bent-lever balance is more convenient in use than any other form of gravity balance because it indicates the weight by direct observation without having to slide a counterpoise, or shift the fulcrum, or put counter-balancing weights in a scale-pan. A spring balance also has these advantages, but a spring is not so reliable and constant as gravity. On the score of simplicity of construction and delicacy of action a bent-lever balance is better than a spring balance. The one great defect of the bent-lever balance is the irregularity of its scale; therefore this paper is written to explain clearly how this solitary defect of this otherwise excellent form of balance can be remedied in a very simple way.

In the bent-lever balance the counterpoise arm is actually much longer than the scale-pan arm, and these lengths are constant, but the virtual lengths of the two arms change with every change of weight in the scale-pan. The virtual length of the arm is the horizontal distance between the fulcrum and a line drawn vertical to the centre of gravity of the arm and its attached or suspended weight. If the angle of deflection of the long arm from the vertical be called A, then the virtual length of the long arm will vary as the sine of A, and the virtual length of the short arm will vary as the cosine of A, exactly if the effective directions of the two arms are at right angles, otherwise approximately. This relationship gives a scale increasingly compressed in the direction of the higher readings.

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* Trans. Linn. Soc., 2nd ser., Zool., vol. viii, p. 117.