Whales and Caisson Disease

I DOUBT if whales avoid caisson disease—the usual consequence of deep diving—by filling their lungs with sea-water as Dr. J. Argyll Campbell suggests[1]. Where whales abound, the temperature of the water is sometimes as low as 28° or 29° F. Moreover, their valvular blow-holes seem designed to keep out the sea-water: not to let it in. So far as I have observed, whales expel water from their blow-holes only in the form of vapour.

If Dr. Campbell had said mucous instead of sea-water he might have been, perhaps, on somewhat firmer ground. Scoresby[2] says, "a moist vapour mixed with mucous" is discharged from the blow-holes of the Greenland whale, and as stated in my letter on the "Sleep of Whales"[3], quantities of what looked like mucous discharged from their blow-holes were sometimes seen floating on the surface of the sea.

There is still another way in which the whale might avoid diver's paralysis or caisson disease. I mean by the 'short circuiting' of its pulmonary circulation. This theory also assumes the deeply submerged whale to be independent, as regards oxygen, of the air in its lungs.

The idea of a whale deeply submerged with its lungs short-circuited and living on oxygen stored in its *retia mirabilia*—peculiar vascular organs possessed by whales—is, I understand, not one that appeals to the physiologist; nevertheless, as I have stated elsewhere[4], it is one that seems to explain first, why the *ductus arteriosus* is in a patent condition in whales; secondly, why each time a whale comes up from the depths it remains at or near the surface some minutes during which it takes a number of breaths, and lastly, why the newly-born animal escapes death from drowning.

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Oct. 27.

[1] NATURE, **134**, 629, Oct. 20, 1934.
[2] "Arctic Regions," vol. 1, p. 456.
[3] NATURE, **99**, 636, April 30, 1927.
[4] "The Physiology of Whales", *Naturalist*, August 1934.

'Dry Ice' in the Machine Shop

IN the issue of NATURE of October 6, on page 529, mention is made of the use of 'dry ice' in the machine shop.

Some readers of NATURE may be interested to know that dry ice is used regularly by one of our large automobile companies. The exhaust valves on the cars manufactured by the concern in question seat on a ring of heat and corrosion resisting material set into the cast iron of the block. The ring is made over-size by the required amount and is shrunk by means of dry ice. As the motor blocks pass by on a conveyor, the rings are removed from the dry ice refrigerator and are slipped into place in the block. As they come up to room temperature, they of course expand and are held firmly in place.

There would seem to be many advantages in making this type of a fit. Certainly in the case mentioned, the other way of inserting the rings, namely by heating the cylinder blocks, would be expensive and inconvenient. THEODORE H. BEARD,
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Freshwater Research in New Zealand

THE New Zealand Freshwater Research Committee commenced in 1932 to investigate the mortality occurring up to the fry stage in the life-histories of wild Brown Trout (*Salmo trutta*), Rainbow Trout (*S. irideus*) and Quinnat Salmon (*Oncorhynchus tschawytscha*).

Observations have been made on thirteen streams, and 180 samples have been taken from spawning redds. More than 80,000 eggs and alevins have been examined.

The average fertility of ova has proved to be 98·9 per cent. In Slovens Creek, 62 Brown Trout fry emerge per 100 eggs lodged in the redds. In Winding Creek there has been a fluctuation in the annual emergence of Quinnat Salmon fry of from 86 to 95 per 100 ova lodged. Losses have been associated with causative factors.

Work is proceeding on further material in hand and will probably be extended to cover most of the important spawning regions in the Dominion.

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Sunspot Number and the Refractivity of the Air

IN connexion with the note by L. W. Tilton on the relation between the sunspot number and refractivity of dry air[1], it is of interest to examine whether such a relation may be deduced from the astronomical observations. For this purpose we have selected twenty independent determinations of the refraction constant (μ) and reduced them to 0° C.,

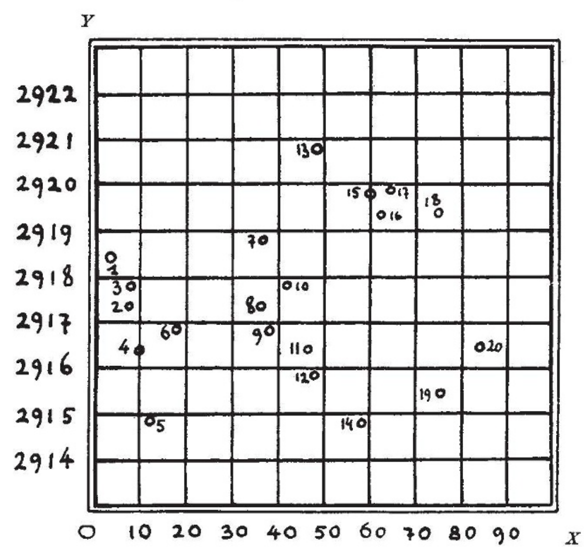

FIG. 1.

760 mm. pressure, 6 mm. vapour pressure (π), $\varphi = 45°$ and sea-level. The corresponding values of the index of air (n) as well as the relative sunspot numbers for the approximate mean epochs of the determinations of μ are shown in the Y and X axes of Fig. 1. The diagram does not show any marked dependence of index of air on sunspot number. Assuming $y = ax + b$, we have: $a = +0{\cdot}10$, $b = 1{\cdot}00029171$, the correlation coefficient being