stantly met, sometimes in small numbers, sometimes as many as 200 in one day. The grounds visited were those about Bouvet Island; thence southward towards the ice and along the ice edge eastward to 90 deg., that is, to a position off Queen Mary Land in the Australian Antarctic Territory; then westward to the vicinity of Enderby Land. Between her departure from Capetown and her return to that port at the conclusion of the marking, the *William Scoresby* steamed 17,500 miles and passed 122 days out of sight of land. G. W. Rayner, a member of the *Discovery* scientific staff, was in charge of the operations, with Captain C. R. V. Boothby, R.N.R., in executive command.

THE London correspondent of the *Journal* of the American Medical Association writes: "Again the figures of the registrar general show that as a people the English are growing older as a result of the falling birth and death rates. The birth rate for 1934 was 14.8 per thousand of population. In the last thirty odd years the rate has been halved. This fall is without parallel in the history of this or any other country. The infant death rate in 1934 was 59 per thousand live births; in the quinquennium 1901–1905 it was 138. The general death rate has also been falling steadily. In the quinquennium 1901–1905 it was 16.1 per thousand of population; in 1934 it was 11.8, which was 0.4 above that for 1933, the lowest on record. The increasing aging of the population is shown by the proportion of the persons over the age of 70 years per 10,000 of the total. In 1911 they numbered 297; in 1921, 344; in 1931, 426 and in 1932, 434. The registrar general therefore describes the increase in the number of old people as 'an outstanding feature of our vital statistics.'"

DISCUSSION

THE NEW ACTIVE PRINCIPLE OF ERGOT

RECENT work, revealing the presence in ergot of a water-soluble principle acting very promptly on administration by the mouth, has evidently aroused wide interest. In the issue of SCIENCE for March 29 (*Supplement,* p. 10) a short review was given of the paper[1] published on March 16, in which we described the isolation in crystalline form of the chemical characters and the action of the substance responsible for this effect—a hitherto unknown alkaloid, to which we gave the name "Ergometrine." This had resulted from joint work, on which we had been engaged ever since one of us (Moir) first demonstrated, in 1932, that watery extracts of ergot contained a substance different from any of the principles hitherto known, and acting in this way.[2] Though our work had thus extended over nearly three years, it had been interrupted by the circumstance that Moir accepted, during its progress, a pleasant invitation to visit the United States, where, during a visit of some six months, he had the opportunity of lecturing to American colleagues and demonstrating the method of recording contractions of the puerperal human uterus, which had first revealed the presence of this ergot principle, and which enabled it to be detected and measured in the course of our chemical work. It is now evident that the matter was of such interest to colleagues in Baltimore and Chicago, where the lectures were given, as to stimulate investigators in both centers to independent researches, having the object of identifying the unknown principle. Our own quest for it was resumed on Moir's return to London. This concurrent effort has had the result, in many ways satisfactory, that our recognition of the principle as a new ergot alkaloid has received double confirmation, not only independent but almost simultaneous, from both these centers. The March issue of the *Journal* of the American Pharmaceutical Association (p. 185) contains a paper by M. R. Thompson, of Baltimore, who was probably the first to recognize that the unknown principle had alkaloidal properties. His paper is chiefly concerned with an alkaloidal fraction containing it; and, from the details of the physiological action described, it would appear that this fraction, which he calls "alkaloid X," still contained much alkaloid of the ergotoxine type. In a footnote, however, Thompson reports a later success in crystallizing what was very probably our Ergometrine. The issue of SCIENCE for April 19 (p. 388) publishes a statement entitled "Ergotocin," by M. S. Kharasch and R. R. Legault of Chicago. These authors had apparently not yet seen our paper of March 16, or the abstract of it given by SCIENCE of March 29. In their own earlier paper on the subject, by Davis, Adair, Rogers, Kharasch and Legault, published in the *American Journal of Obstetrics and Gynecology* for February (p. 155), the Chicago group described an impure preparation, having a high activity of the type under discussion, and regarded by them as non-alkaloidal; and they there stated that Eli Lilly and Company had made arrangements to prepare and issue this preparation, and had "given it the trade name 'Ergotocin.'" Again in a footnote, these authors recorded a subsequent success in crystallizing the principle; and it seems clear from the note in SCIENCE (April 19) that they have now recognized that the crystalline principle is alkaloidal and desire to transfer to it the name "Ergotocin." The characters which they attribute to it are those of Ergometrine.

We should like to make it clear that it is far from our intention to engage in a discussion of priority on

[1] *British Medical Journal,* i, 520, 1935.
[2] *British Medical Journal,* i, 1119, 1932.

the basis of note-book records. There can be no doubt that these two American investigations were in progress simultaneously with our own, that they led to the isolation of the same substance independently and that the fact of its crystallization was, in each case, briefly announced at a date not distant from that on which we first described its properties and named it. Our concern is to ensure that the further literature in an important field should not be complicated and confused by a multiplicity of names for the same substance. Our paper, in which the name "Ergometrine" was given to the pure alkaloid, had, in fact, already been published before that by Davis *et al.* came into our hands; but, even if we had seen this paper earlier, we could hardly have felt entitled to consider the scientific adoption, for our alkaloid, of the name Ergotocin, which was there mentioned only as the trade name of an impure and supposedly non-alkaloidal preparation. We hope that, in suggesting to our American colleagues the propriety of adopting "Ergometrine" as the proper, scientific name for the pure alkaloid, we shall not be misunderstood as depreciating the contributions of those who have been working in the same field.

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THE PROTECTION OF WHALES FROM THE DANGER OF CAISSON DISEASE

THE interesting account by Laurie[1] of respiration in the large and active whales of the Antarctic has stimulated discussion of the problems presented by the necessarily peculiar respiratory activity of these animals during prolonged submersion at great depths. As to the limits of their dives there may be some question, but there is no doubt that whales descend to the depth of 100 meters and thereby encounter hydrostatic pressure of about 10 atmospheres. A terrestrial mammal which has been breathing air in a caisson at a pressure greater than 2.4 atmospheres encounters the danger of effervescence of the dissolved nitrogen in the tissues if by ascending rapidly the pressure is reduced more quickly than the blood can transport the released nitrogen to the lungs. The resulting bubbles of gas obstruct circulation and cause caisson disease. Whales do not apparently suffer from caisson disease, and yet their respiratory system is, as far as we can see, typical for mammals.

The whale does not, however, enter a caisson and rebreathe air under pressure. It submerges with one lung volume of air. An estimate of lung volume at 10 per cent. of the body volume can not be far wrong and would start the diving whale with about 8 per cent. of its body volume as nitrogen. Human divers do not suffer from caisson disease until they have been exposed to 2.4 atmospheres absolute pressure,[2] so that the human body can evidently rapidly eliminate the amount of nitrogen contained after saturation at the 1.4 atmospheres extra pressure. In 100 cc of blood and other tissues about 1 cc of nitrogen is dissolved per atmosphere of pressure, and in fat about five times as much.[3] Applying these figures to a whale with 25 per cent. fat[4] at 2.4 atmospheres absolute pressure indicates the ability to eliminate rapidly and with safety 1.4 $(0.75 \times 1 + 0.25 \times 5) = 2.8$ per cent. of its body volume of nitrogen. About one third of the nitrogen in a whale's lungs could be safely dissolved in the tissues and rapidly eliminated.

To introduce one third of the nitrogen of the lungs into the tissues would reduce the amount of gas in the lungs by one quarter, would require an increase in pressure of 2.4 times and would consequently diminish the lung volume to $\frac{1}{2.4} \times \frac{3}{4} = 0.28$ of the normal volume at atmospheric conditions.

The next question is, whether the lungs could be compressed by hydrostatic pressure to the extent of much less than one quarter of their capacity. The lungs of diving animals are not freely open to the exterior as in man. The nasal orifices can be tightly closed, and the bronchioles (in the porpoise) are supplied with contractile tissue which can likewise effectively hold air in the lungs.[5] The thoracic cross section is nearly circular and the intercostal and abdominal musculature is strong. These structures could support great pressure, particularly if there were no movement of the supporting respiratory muscles. But, if the intrathoracic pressure remained low, while the external hydrostatic pressure increased, there would only arise another problem of how to prevent the injection of viscera, blood and lymph into the thorax. It seems likely that the pressure in the lungs would be close to the external hydrostatic pressure, and that most of the nitrogen in the lungs would be forced into solution in the blood and tissues.

The whale's nitrogen capacity has been calculated at about 2 per cent. of the animal's volume per atmosphere pressure. Four atmospheres extra pressure would then cause the solution of all lung gases (provided that total collapse of the lungs occurs) and would still dissolve in the tissues only three times as much nitrogen as the human diver can rapidly eliminate. The human safety

[1] Alec H. Laurie, Discovery Reports, vii, 365, 1933.

[2] L. Hill, "Caisson Sickness and the Physiology of Work in Compressed Air," p. 75. London, 1912.

[3] *Ibid.*, p. 171.

[4] Alec H. Laurie, *loc. cit.*

[5] G. B. Wislocki, *Am. Jour. Anat.*, xliv: 47, 1929.