On Experimental Growth *in situ*.

ON the hypothesis of senescence elaborated by Robertson ("Chemical Basis of Growth and Senescence," 1923), adult tissue can only revert to a reproductive phase when the so-called *kern-plasma* relation and nutrient level of its elements has been reduced, and the inhibitory products of previous growth (autocatalysts) have been—and continue to be—removed. But Gye and Barnard have shown that ultramicroscopic organisms occur in (and can be cultivated from) the fluids derived from—at least—some cancerous tissues. Such ultramicroscopic organisms also exhibit specificity. Let Robertson's hypothesis be accepted, then it is a reasonable assumption, which can probably be tested, that these ultramicroscopic organisms may primarily be feeding on the products of autocatalysis in the tissues in which they are found. If, therefore, these organisms could be cultivated in fluids derived from healthy tissues homologous with those from which they were derived, or even in the tissues themselves, partial proof of the assumption would be obtained.

Now Gye and Barnard have actually shown that pathological growth may be produced in some cases by a 'specific factor' plus a 'virus.' But apparently it is not possible to stimulate growth in a tissue by merely injecting into it a culture or extraction containing the pathological organisms. Robertson's hypothesis, however, demands two conditions for resultant growth in adult tissues, namely, (*a*) reduction of the *kern-plasma* relation, which may be effected by various stimuli (chemical, physical, mechanical abrasion or irritation, cutting, or agents causing disruption or decay of cells, etc.), as well as (*b*) removal of the autocatalysts. Thus the mere injection of organisms to remove (presumably) the autocatalysts in a tissue may not be enough to stimulate growth, and reproduce the hyperplasia without the concurrent reduction of the *kern-plasma* relationship.

In order, therefore, to induce unrestricted growth in a tissue *in situ* it is necessary *ex hypothesi* (1) to stimulate the tissue in some way to regenerative activity—thereby ensuring the reduction of the *kern-plasma* ratio; and (2) to add pathological organisms which will remove the autocatalytic products of the stimulated growth, and permit continued growth; such organisms having been derived from a tissue homologous with that in which the new growth is required. It is possible that experiments fulfilling the conditions outlined above may not have been tried, and no excuse is needed for advancing any reasonable suggestion on this important subject.

X.

Postulates of Hydrodynamics.

OF a mass of fluid satisfying the condition of continuity and having a continuous velocity field, the mathematical theory of fluid motion postulates that fluid elements—line, surface, volume—not crossing a surface of discontinuity, of which there may be a finite number, maintain their identity and order of magnitude.

As a dynamical consequence, in a perfect fluid, the forces being restricted to surface pressures and potential body forces, the initial distribution of vorticity is inherent in the volume elements of fluid, and remains so in the subsequent motion.

In particular, if the initial motion is irrotational everywhere (except in the sheets of vorticity), the subsequent motion is irrotational (except in the sheets of vorticity).

Without questioning the correctness of these propositions in the realm of mathematical logic, the present writer has found them a formidable barrier to the understanding of actual fluid motions familiar to the physicist and the engineer, and offers the following physical propositions.

Fluid elements—line, surface, volume—can be effectively subdivided into two or more distinct portions separated by intervening fluid.

A mass of perfect fluid consisting of several distinct parts, each with its own velocity potential, and separated by thin sheets of transition (in mathematical limit, vortex sheets) may be effectively redistributed so that the identity of the irrotational elements of volume falls below the threshold of observability, and new mean elements with an effective finite distribution of vorticity become the objects of physical observation and measurement through the whole or part of the joint mass.

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The Library, Air Ministry,
Kingsway, W.C.2, Mar. 26.

The Spectrum of Ionised Argon (A II).

FOR some time the spectrum of ionised argon (A II) has been a subject of investigation in the Amsterdam Laboratory 'Physica.' My analysis of the spectrum of neutral fluorine F I (*Verslagen.*, Amsterdam, June 1926, Dec. 1926. *Zeits. f. Phys.*, **39**, 869; 1926) and the analysis of the spectrum of ionised neon Ne II (*Versl.*, Amsterdam, May 1927. NATURE, **119**, 925; 1927. *Zeits. f. Phys.*, **44**, 157; 1927. **46**, 856; 1928) formed preliminary steps for the analysis of the A II spectrum. A great part of the A II lines have now been classified by me. I have found a doublet and a quartet term system. The term structure exhibits a perfect analogy to that of F I and Ne II. The following triplet $4p^4S$-$4s^4P$: (9) 3729,300; (8) 3850,565; (7) 3928,599 involving the deep quartet $4s^4P$ term with the term differences: 844,40 and 515,70, gives the key for the analysis of the spectrum. As examples, the other deep quartet terms are given:

$4p^4P$	with the term differences:	307,75 and 357,30
$4p^4D$	,, ,,	439,36; 494,57; and 260,32.
$(3)d^4D$	,, ,,	153,98; 149,62; and 107,03.

The complete term table for A II, the lists of classified lines, the new measurements, and the analogy with the spectrum of ionised neon will be published in the *Zeits. f. Phys.*

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The Buoyancy of Whales.

MR. GRAY'S suggestion (NATURE, Mar. 17, p. 421) that whales dying at the surface sometimes float because the air in their lungs is held in by the valves of the blowhole is very interesting, and perhaps helps also in understanding how whales can remain so long under water. There are, however, so many unusual features about whales that one cannot help wondering whether other explanations are not possible. It is, for example, conceivable that whales breathe differently from other mammals, and that the muscular effort they expend in breathing is used not for drawing air into their lungs but for driving it out. On this view the filling of the lungs would be due to the elastic recoil of the thoracic wall and expansion of the cavity following the muscular contraction, and when a whale dies and the muscles relax the lungs would fill with air if the blowhole is above the surface or with water if it is below.

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