processed gelatin (also first extraction), were examined by the method of light scattering for M_w, and by the Sanger end-group technique for C_n (the number-average chain-length). The results for the alkali-processed material are given in Table 1.

Table 1

Fraction	M_w	C_n
2	270,000	55,000
3	142,000	70,000
4	74,000	70,000
5	57,000	70,000

If the gelatin molecule consisted of a single polypeptide chain, it would be expected that M_w and C_n would only differ slightly, owing to imperfect fractionation. The very large differences observed may be interpreted as indicating that the gelatin molecules of higher molecular weight are composed of some half a dozen chains covalently linked in some way. It seems likely that these linkages have their origin in the collagen and are not produced in the conversion of collagen to gelatin.

Refractionation has been used to show that the extreme heterodispersivity needed to account for the results, if C was identical with M, is not the cause of the discrepancy. An examination of the F.D.N.B. reaction in the light-scattering cell has shown that the conditions used do not cause marked degradation while the reaction is in progress. There is, on the contrary, some indication of a cross-linking reaction. This would not interfere with the determination of the α-amino-groups.

Somewhat similar results to those with the alkali-processed gelatin were obtained with the acid-processed gelatin fractions. The situation was complicated by an indication that, at least for the lower molecular weights, the chains did not always terminate in an α-amino-group at one end.

A. G. Ward

[1] Sanger, F., *Biochem. J.*, **39**, 507 (1945).
[2] Anderson, A. J., and Maclagan, N. F., *Biochem. J.*, **56**, xxv (1954).
[3] Stainsby, G., *Nature*, **177**, 745 (1956).

INTERNATIONAL WHALING COMMISSION

EIGHTH ANNUAL MEETING

THE eighth annual meeting of the International Whaling Commission was held in London during July 16–20, all the seventeen contracting Governments, with the exception of Brazil, being represented. They were: Australia, Canada, Denmark, France, Great Britain, Iceland, Japan, Mexico, the Netherlands, New Zealand, Norway, Panama, South Africa, Sweden, the U.S.S.R. and the United States. Italy and Portugal were represented by observers, as were also the Food and Agriculture Organization of the United Nations, the International Council for the Exploration of the Sea and the International Association of Whaling Companies. Dr. G. J. Lienesch (Netherlands), chairman of the Commission, presided.

According to the figures compiled by the Bureau of International Whaling Statistics at Sandefjord, nineteen factory ships with 257 catchers were engaged during the 1955–56 Antarctic season, and the total catch by floating factories increased from 2,061,789 barrels to 2,134,012 barrels inclusive of sperm oil; there are six barrels to the ton, and the average price for whale oil is £70–80 per ton. The chief object of the Commission is to arrange a balance between killing- and replacement-rates of the whale populations, and to achieve this it sets limits upon the total catch. The limit takes into consideration the views of scientists upon the size of the stocks of whales and of the whalers on the economics of the industry, the scientific opinion being almost unanimously in favour of a substantial reduction in the catch on account of evidence that the stock is declining. The existing limit is 15,000 blue whale units, and the Commission recommended that the catch for future seasons should not exceed this amount, and it further recommended (with one dissentient) that the limit should be reduced during the coming 1956–57 season to 14,500 blue whale units.

Infractions of the whaling regulations during the past year were fewer than those of the previous year. At present every factory ship is required to have on board two inspectors who are generally of the same nationality as the flag of the ship. However, following the seventh meeting of the Commission in Moscow in 1955, the United States was asked to prepare a protocol for the amendment of the Convention so as to permit consideration of a scheme to appoint independent observers in addition to the national inspectors. All possible steps are now being taken to ensure that the protocol can be brought into force in time for the Commission to take action under its provisions at its ninth meeting, and it is hoped that the protocol will very soon be signed.

A statement of expenditure for the year ending May 31, 1956, amounting to £3,196, was approved by the Commission. For the current year due to end on May 31, 1957, the expenditure by the Commission is estimated at £2,935, and the contribution requested of each of the twelve contracting Governments remains at £150. £500 was set aside towards the cost of whale marking, which is the means of providing much of the essential scientific data on which the Commission's recommendations for the conservation of the whale stocks need to be based.

It was decided that a scientific sub-committee should again if necessary meet to consider certain scientific problems in anticipation of the next annual meeting, which will also be held in London, commencing on June 24, 1957.

THE B.B.C. AND ITS EXTERNAL SERVICES

A BOOKLET entitled "The B.B.C. and its External Services"*, describing the B.B.C.'s transmissions for listeners overseas, is of special interest at the present time in view of Sir John Glubb's recent convincing arguments that expenditure on the dissemination of ideas brings a higher dividend than expenditure on weapons. The booklet does not indicate what proportion of the B.B.C.'s income of £21 million from licence receipts (of which in 1955–56 the Government retained £2·75 million), £1 million from publications and £5·322 million from grants-in-aid was expended on external services; but these services in English and forty-three other languages are heard throughout the world, and occupy about eighty hours daily.

* The B.B.C. and its External Services. Pp. 32. (London: B.B.C. 1956.)

Thirty-nine high-power short-wave transmitters are used, of which two, for relay purposes, are operated at Tebrau, in Johore, by the B.B.C. Far Eastern Station. Medium-wave transmissions from Britain are largely confined to the radiation of those parts of the European Service broadcast to Western Europe throughout the evening on 224 m. Other long and medium wave-lengths are used when not required for the B.B.C.'s domestic services. Certain of the European Services are also broadcast by a high-power medium-wave transmitter at Norden in north-west Germany, with a medium-power relay in Berlin operating on the same wave-length, and are re-broadcast additionally over a very-high-frequency frequency-modulated transmitter in Berlin, where many suitable receivers are in general use.

To provide an effective signal in the area served by each programme, highly directional short-wave transmitting aerials are used, the appropriate aerial being selected from 177 aerials at the various transmitting-sites; but even this large number is insufficient to meet all propagation conditions. A continuous schedule of aerial conversion to different wave-lengths is required to ensure that programmes are radiated in the most easily receivable wave-bands, and this programme is designed to keep pace with the trend of solar activity. During the next four years the B.B.C. will make regular use of the higher-frequency bands for its external services, and wave-lengths in the 13-m. and 11-m. bands now serve large areas of South and South-East Asia, the latter band in particular providing transmission which escapes the severe interference affecting many of the external services programmes on the longer wave-lengths. Some of this interference is due to the overloading and unplanned operation of the bands allotted to short-wave broadcasting; but much of it is caused by deliberate interference (jamming) with certain language transmissions from the B.B.C. and from other countries. This jamming also affects the adjacent wave-lengths.

The Monitoring Service, which intercepts and reports foreign broadcasts, is an integral part of the External Broadcasting Organization. The B.B.C. has close ties with most of the forty-five broadcasting organizations in the British Commonwealth, and offices for B.B.C. representatives are maintained in Cairo, Delhi, New York, Ottawa, Paris, Sydney and Toronto.

THE SONIC GAS ANALYSER

By Dr. A. E. MARTIN

Sir Howard Grubb, Parsons and Co., Ltd., Newcastle upon Tyne

ALTHOUGH efforts have frequently been made to develop a gas analyser depending on the variation of the velocity of sound with the nature of the gas, no practical instrument was produced until quite recently. The successful development of this gas analyser is due to the efforts of, among others, J. G. Dawes[1], J. H. D. Walton[2], L. E. Lawley[3], and D. Mounfield (Sir Howard Grubb, Parsons and Co., Ltd.).

The sonic gas analyser has certain advantages over some other types of instrument, the more important being: (1) no correction for variations in pressure is necessary since the velocity of sound is independent of pressure; (2) temperature compensation is easily arranged; (3) practically any mixture of gases can be dealt with; (4) the time lag can be made negligible; (5) the analysis unit is intrinsically safe and, since it can be placed at any distance from the measuring unit, can be used in refineries, coal mines and other places where an explosive atmosphere may be found; (6) it is possible to calculate to within a few per cent the sensitivity of the instrument and therefore actual calibration is unnecessary in many cases.

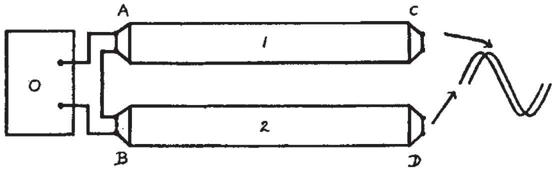

Fig. 1. Principle of the sonic gas analyser

Fig. 1 illustrates the principle of operation of the sonic gas analyser. A and B are sound transmitters, which for convenience may be deaf-aid magnetic earpieces, and these are actuated together by the oscillator O. Each transmitter is placed at one end of a tube and a similar earpiece is mounted at the other end of the tube to act as a microphone. If the distances A to C and B to D are equal, and both tubes contain the same gas, the time taken for sound to travel from A to C will be exactly the same as from B to D and the a.c. signals derived from the receivers C and D will be in phase. If now the gas in tube 2 is replaced by a heavier gas, for which the velocity of sound is lower, the signal received by D will lag behind that arriving at C by some angle θ, as indicated in Fig. 1. It is easy to see that

$$\theta = 2\pi fd \left(\frac{1}{V_2} - \frac{1}{V_1}\right) \qquad (1)$$

where f is the frequency of the sound, d the distance from transmitter to receiver in either tube, and V_1 and V_2 the velocity of sound in tubes 1 and 2, respectively. By employing two tubes in this way temperature effects largely cancel out.

It is nowadays possible to measure θ by the application of electronic techniques, and in one particular instrument, for which $f = 3{,}000$ c./s. and $d = 30$ cm., full scale for a phase change of 20° is obtained.

To calculate the phase change to be expected for any given gas mixture, it is convenient to rewrite equation (1) by using the relation $V = \sqrt{\frac{\gamma RT}{M}}$, where γ is the ratio of the specific heats c_p/c_v, R the gas constant, T the absolute temperature and M the molecular weight. We then have:

$$\theta = \frac{2\pi fd}{\sqrt{RT}}\left(\sqrt{\frac{M_2}{\gamma_2}} - \sqrt{\frac{M_1}{\gamma_1}}\right) = 207\left(\sqrt{\frac{M_2}{\gamma_2}} - \sqrt{\frac{M_1}{\gamma_1}}\right)$$

in degrees for the values of f and d given above and for a temperature of 20° C. The variation of θ with temperature is approximately 1 part in 600 per 1° C. For most diatomic gases γ is close to 1·4 and then $\theta = 175°$ $(\sqrt{M_2} - \sqrt{M_1})$. Thus for air ($M_2 = 28{\cdot}95$) and nitrogen ($M_1 = 28$), $\theta = 15{\cdot}6°$, which is nearly full scale on the standard instrument.