These factors have already proved important in the case of keratin⁷.

(2) The intermolecular contractile factor due to a variation in the number of ionised groups belonging to single molecules. This factor, which has not yet made its appearance in the literature of protein chemistry, is nevertheless an obvious possibility. The number of ionised groups possessed by a nucleic acid molecule⁸ varies considerably with pH. The chromosome micelle—a protamine nucleate aggregate⁹—will therefore be capable of strikingly different configurations for different pH values, the nearer the pH approaches to the isoelectric point of the protamine nucleate the greater being the degree of contraction. In view of the differential density of nucleic acid along the length of the chromosome, differential condensation (heteropycnosis)⁴ is naturally to be expected. This type of contractile factor also offers a simple interpretation of the results lately obtained by Kuwada and Darlington with ammonia vapour and with acetic and nitric acid³.

(3) The intramolecular contractile factor as exemplified by keratin⁷. In the case of keratin a contractile factor of 2 in particular has been attributed to intramolecular folds of the nature of linked pseudo diketopiperazine rings. Evidently there may be other and more considerable degrees of contraction if the rings in question are formed not by two consecutive amino acid residues but by a run of 3, 6, 7, 10, 11, . . . , $4n - 2, 4n - 1$ residues. The first of these, yielding a contractile factor rather greater than $8/3$, may be the explanation of the contractile factor of about 3 recently announced for myosin films¹⁰. I now suggest that the chromosome micelle, evidently less stable than myosin and considerably less stable than keratin, will prove capable of a grosser type of folding, which will yield a far higher factor than the 2 of hair and the 3 of myosin.

(4) The intramolecular contractile factors due to the sharing of an electron by the ketonic oxygen and the hydrogen atom belonging respectively to the carbon and nitrogen atoms in the backbone of a protamine molecule¹¹.

(5) The macroscopic 'twizzling' factor as exemplified by keratin fibres¹². This contractile factor is of quite different type from the three preceding ones. It is 'macroscopic' in the sense that it is a property not of individual molecules but of the micelle as a whole.

D. M. WRINCH.

Mathematical Institute,
Oxford.
April 6.

¹ NATURE, 134, 978, December 22, 1934.

² "Chromosomes and their Structure". (In course of publication in the *J. Roy. Micro. Soc.*)

³ C. D. Darlington, "Recent Advances in Cytology". London, 1932. Y. Kuwada and T. Nakamura, *Mem. Coll. Sci., Kyoto*, 9, 129-139; 1933. Y. Kuwada and T. Nakamura, *ibid.*, 9, 343-366; 1934. N. Shinke, *ibid.*, 9, 367-392; 1934. P. Ch. Koller and C. D. Darlington, *J. Genet.*, 29, 159-173; 1934.

⁴ C. D. Darlington, *Cytologia*, 4, 229-240; 1933.

⁵ T. S. Painter, *J. Hered.*, 25, 465-476; 1934. C. W. Metz and E. H. Gay, *Proc. Nat. Acad. Sci.*, 20, 617-621; 1934. R. L. King and H. W. Beams, *J. Morph.*, 56, 577-588; 1934. H. J. Muller and A. Prokofeva, *Comptes Rendus de l'Acad. des Sciences de l'U.R.S.S.*, 4, 74-83, October 11, 1934. P. Ch. Koller, NATURE, 135, 69, January 12, 1935.

⁶ Reference should be made to the literature of the 'zwitterion', specially to L. J. Harris, *Biochem. J.*, 24, 1080-1097; 1930.

⁷ W. T. Astbury and H. J. Woods, *Phil. Trans. Roy. Soc., A*, 232, 333-394; 1933. W. T. Astbury, "Fundamentals of Fibre Structure". Oxford, 1933.

⁸ P. A. Levene and L. W. Bass, "Nucleic Acids", New York, 1932.

⁹ D. Jordan Lloyd, *J. Int. Soc. of Leather Trades' Chemists*, 245-258; 1933.

¹⁰ W. T. Astbury, NATURE, 135, 95, Jan. 19, 1935.

¹¹ D. Jordan Lloyd, *Biol. Rev.*, 7, 254-273; 1932.

¹² A. Stanberry and B. Byerley, *J. Text. Inst.*, 295T, 1934.

α -Tracks in Presence of Strong γ -Radiation

IN investigations of nuclear transformations, it is sometimes desirable to be able to observe α -particles (or protons) in the presence of strong γ -radiation. This has already been successfully accomplished by means of an ionisation chamber connected up to a valve-amplifier and oscillograph (as in the investigations of Chadwick and Goldhaber¹ on the photo-disintegration of heavy hydrogen).

It may be of interest that, under suitable conditions, it is also possible to observe α -particles in the presence of strong γ -radiation by the Wilson cloud method. The accompanying photograph (Fig. 1) shows the tracks of α -particles from polonium deposited on the outside of the brass cylinder A, in the presence of γ -rays from a 25 mgm. emanation tube placed inside A.

FIG. 1.

The best conditions appear to be obtained with hydrogen in the chamber, at an initial pressure of about 40 cm. mercury, and a high expansion ratio somewhat above 1.4. Under these conditions, about 60 per cent of the α -tracks observed in the absence of γ -radiation are still observed when a source of about 25 mgm. is placed in A. The conditions become rapidly worse if the strength of the source is increased much above 30 mgm. and this appears to be about the maximum unfiltered emanation source that can be placed inside the chamber without destroying the cloud tracks of α -particles.

About five hundred photographs were taken with the cylinder A covered with beryllium, and a 20-30 mgm. emanation source inside A, in order to investigate further the disintegration of beryllium by γ -rays, observed some time ago by Szilard and Chalmers². No α -tracks were observed. Assuming that tracks of range R cm. in air are actually produced, this means that the cross-section for the photo-disintegration of a Be nucleus is less than about $5 \times 10^{-30} R^{-1}$ cm.².

D. CAMERON.

Physical Laboratory,
University.
Manchester.

¹ NATURE, 134, 237; 1934.

² NATURE, 134, 404; 1934.

The Spectral Selective Photo-Electric Effect

ZENER has recently¹ discussed Fowler's theory² of the spectral selective photo-electric effect, and concludes that it is incapable of explaining the observed order of magnitude of the emitted current. Inasmuch as a direct calculation³ of the photo-electric emission from a pure metal yields a spectral distribution curve