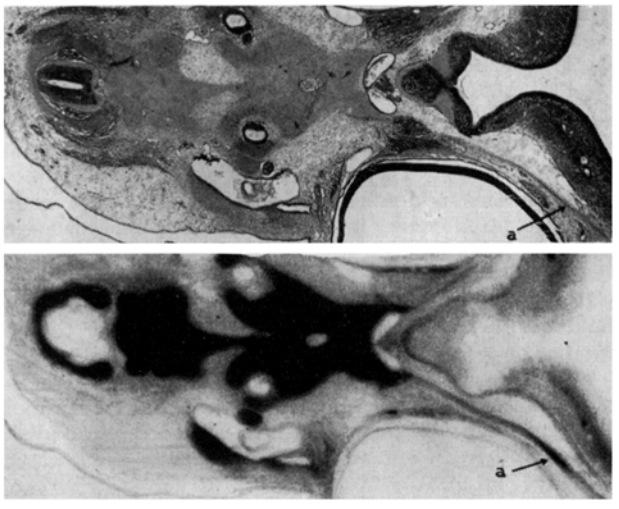

Fig. 2.–Cross section of the base of the head of 144 h embryo. 14·5 ×.

(cf. Fig. 1). In the wing and in the pelvic limb, the ratio between the radioactivity of the regions in which cartilage and derm and subcutanous tissue respectively will differentiate amounts to 3·4:1 ca. The increasing of this ratio runs parallel with the increasing of both the amount and the basophylia of the intercellular matrix in the precartilaginous blastemas (e.g. embryos of 7 to 8 days). Remarkable differences of radioactivity occur also in the various regions of each precartilaginous blastema, depending on the different degree of chondrification: the ratio of radioactivity between procartilage and precartilage ranges between 2·7:1 and 2·3:1. A conspicuous uptake of radiosulfate is apparent in 6 days embryos in the clusters of osteoblasts which mark the sites of intramembranous ossification, before the formation of bone matrix proper (Fig. 2 *a*).

(6) Remarkable is the fixation of radiosulfate in the mesenchymal anlage of the spleen (Fig. 1). At the beginning of the sixth day, the ratio between the radioactivity of the spleen rudiment and that of the spinal cord is 3·4:1 ca. Therefore, the sulfate uptake is nearly as great in the spleen as in precartilage; the ratio of radioactivity between the two is 1:1·8 ca.

(7) The subendothelial mucous tissue of the prevalvular cushions of the heart and big arteries fixes a relatively large amount of radiosulfate. In 87 to 90 h embryos, the radioactivity of this material is nearly as high as that of the mesenchymal blastema which surrounds the notochord and will differentiate in the cartilage of the vertebral body.

(8) A relatively great uptake of radiosulfate occurs from the sixth day on in the periendothelial mesenchyme of the main arteries and not in veins of corresponding size. BOSTRÖM and ODEBLAD (l.c.) have shown that a remarkable fixation of radiosulfate takes place in the arterial wall of 22 day rabbit fetuses and adults; the fact that this process starts in very early developmental stages deserves consideration.

(9) Relatively small, on the contrary, is the uptake of radiosulfate in the intestinal epithelium and in the anlage of the liver (Fig. 1). The ratio between radioactivity of the liver and that of the spinal cord was found to be of the order of 1·1:1 at the end of the fifth day. However, the material which accumulates in the lumen of the intestine, and which is presumably a secretory product, appears highly radioactive even at this stage of development (Fig. 1).

(10) The activity of the mesonephros is a little higher than that of the liver, and the radioactivity of the primordium of the suprarenal cortex is still higher in 5 to 6 days embryos.

This preliminary study leads us to the conclusion that in relatively early stages of embryonic development in the chick, quantitative differences of the uptake of radiosulfate occur in the anlagen of several organs and in the various regions of a given tissue, from which histological constituents displaying different structures and functions will differentiate. Obviously, the technique adopted in the present research does not enable us to establish the chemical form, whether organic or inorganic, in which the radiosulfate is fixed in embryonic tissues.

R. AMPRINO

Institute of Anatomy, University of Turin, June 25, 1954.

Résumé

La distribution du radiosulfate introduit dans les embryons de poulet de 3 jusqu'à 7 jours a été étudiée par l'autoradiographie de contraste. Il existe des différences marquées dans la fixation du S^{35} au niveau des ébauches d'organes différents et même dans les diverses parties de chaque tissu. Ces différences sont particulièrement remarquables entre les divers dérivés du mésoderme et elles s'accentuent pendant la différenciation ultérieure.

The Use of Nuclear Emulsions to Determine Small Amounts of P^{33} Present in Samples of P^{32}

This investigation is an attempt to apply the method of radioautography to the quantitative determination of small amounts of radio-active material. The immediate problem is to determine the amount of P^{33} [1] present in samples of P^{32}.

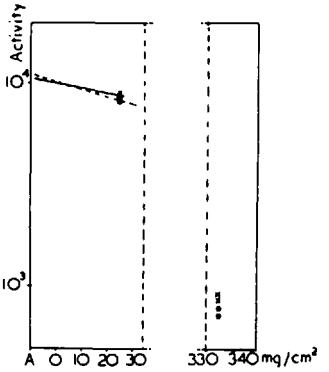

Fig. 1.—A-(by air and window correction)
———— × × P^{32} absorption curve
..... O O mixture absorption curve

The experimental method is based on counting of the numbers of the densely ionised terminal parts of the β-ray tracks in nuclear emulsions. The emulsion thickness used of 200 μ was chosen to include almost the whole length of the tracks from P^{33} [2] while recording only a small proportion of the tracks of P^{32}.

[1] E. N. JENSEN and R. T. NICHOLS, Phys. Rev. *83*, 215 (1951). – R. K. SHELIN, R. B. HOLTZMANN and C. Y. FAN, Phys. Rev. *83*, 215 (1951).

[2] L. E. GLENDENIN, Nucleonics *2*, 16 (1948). – A. BONETTI and G. TOMASINI, Nuovo Cimento *8*, 701 (1952). – L. KATZ and A. S. PANFOLD, Rev. Mod. Phys. *24*, 28 (1952).

A preliminary calibration must be made with a sample containing a measured activity of P^{33} with negligible P^{32}, under identical experimental conditions.

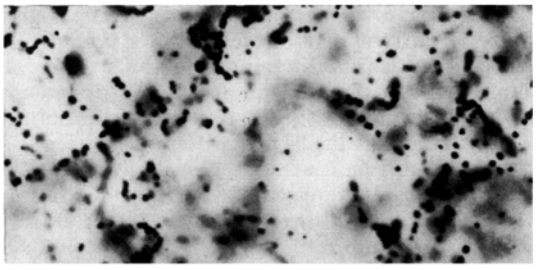

Fig. 2.

Then experiments are made, always under the same conditions, to estimate the amount of P^{33} present in the mixtures, deducing from the counts of tracks in "pure" P^{32} and in the mixtures on the basis of a linear relationship, referring to equal activities.

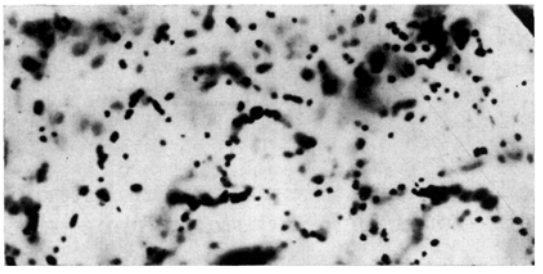

Fig. 3.

Particular attention was paid to the effects of self-absorption[1] by making comparison between specimens evaporated and spread on filter papers, under identical geometrical conditions.

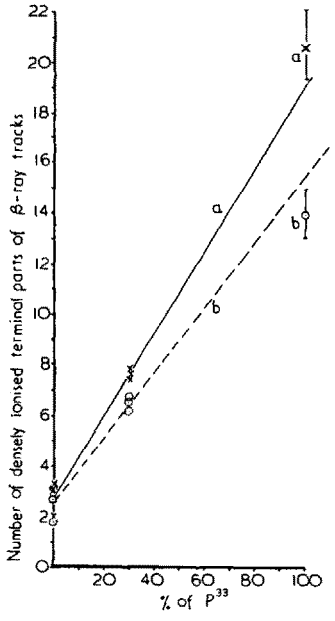

Fig. 4.–Experimental points.
× a = from evaporated samples. ○ b = from 8 mg/cm² filter paper samples

[1] LAPP and ANDREWS, *Nuclear Radiation Physics* (New York, Prentice Hall Inc., 1948), 236.

Three sets of specimens were used;
(1) Freshly prepared P^{32} in solution;
(2) A solution containing about 30% P^{33} together with P^{32}, and
(3) A very old solution containing 99% P^{33}.

All the materials were obtained from A.E.R.E., Harwell.

Direct measurements of the radioactivities were made and absorption curves in aluminium were made using a G.M.4 end window counter, with window and air corrections (Fig. 1).

Ilford G5 nuclear emulsions, 200 μ thick were used in making the track counts. Weighting according to the number of points observed in the track was employed.

The photomicrographs show examples of β-ray tracks in equal areas corresponding to specimens of mixture of the same activity evaporated in an aluminium dish (Fig. 2) and when spread on filter paper of thickness 8 mg/cm² (Fig. 3).

The results are summarised in Figure 4. The sensitivity of this method is evident from the fact that the total activities used in the various experiments lay between 0·015 and 0·035 microcuries.

I wish to thank Professor J. S. MITCHELL for having suggested the problem of P^{33} and for much advice.

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Department of Radiotherapeutics of the University of Cambridge and the Centro Oncologico del Consiglio Nazionale delle Ricerche in Milan, August 17, 1954.

Zusammenfassung

Es wird eine Methode beschrieben, welche die Bestimmung kleiner Mengen P^{33} in altem Radiophosphor erlaubt: P^{33}-Beta-Spuren werden ausgezählt in 200 μ dicken Emulsionsschichten, in denen sie in ihrer ganzen Reichweite enthalten sind.

The Nature of Viral Inclusion Bodies and their Differentiation from Non-viral Inclusions

The nature of inclusion bodies has been the subject of much debate during the past 50 years, and is still not fully understood[1]. The purpose of this paper is (1) to show that all the available evidence can be explained by a single theory, (2) that the theory will help morphologists to distinguish viral inclusion bodies from non-viral inclusions, and finally, (3) to propose terminology which will eliminate the present confusion of terms.

The early discoverers of inclusion bodies considered them as living organisms, most often as Protozoa. That was the opinion of PATERSON[2], GUARNIERI[3], NEGRI[4], RIVOLTA and DELPRATO[5], and others. Filtration experiments which showed that the causative agent of all the above mentioned diseases can pass through bacteriological filters made the protozoan theory, at least in its primitive form, untenable. Since that time two schools of thought have held opposed views and brought forward valuable evidence in support of their opinions.

[1] T. M. RIVERS, *General Aspects of Viral and Rickettsial Infections*, in: *Viral and Rickettsial Infections of Man* (T. M. Rivers, Lippincott, 1948).

[2] R. PATERSON (1841), cited by RIVERS (1928).

[3] G. GUARNIERI. Arch. Sci. Med. *16*, 402 (1892).

[4] A. NEGRI (1903), cited by COVELL and DANKS (1932).

[5] RIVOLTA and DELPRATO (1880), cited by WOODRUFF and GOODPASTURE (1930).