The pions and the charged kaon may be similar to K_2^0 in structure (ref. 2).

The hyperons may have structures similar to the K_1^0 particle because of the similarity in mean life. For example:

$$\text{neutron} + \text{muon} + 4\pi/2a = \Lambda = 2{,}182{\cdot}5 \text{ electron masses}$$

$$\text{neutron} + \text{muon} + 2(4\pi/2a) + 1/2a = \Sigma^0 = 2{,}330{\cdot}4 \text{ electron masses}$$

$$\text{neutron} + \text{muon} + 2(4\pi/2a + 1/2a) = \Sigma^- = 2{,}341{\cdot}3 \text{ electron masses}$$

$$\text{proton} + \text{muon} + 2(4\pi/2a) + 1/2a = \Sigma^+ = 2{,}327{\cdot}9 \text{ electron masses}$$

The resonances can also be represented as combinations. For example:

$$\text{proton} + 3(4\pi/2a + 1/2a) + 4\pi/2a = 1{,}235 \text{ MeV} = N^*$$

$$\text{proton} + 4(4\pi/2a + 1/2a) + 2(4\pi/2a) = 1{,}383 \text{ MeV} = Y^*$$

$$2\pi^0 + 4(4\pi/2a) = 550 \text{ MeV} = \eta^0$$

$$2\pi^0 + \pi^+ + \pi^- + \text{mu}^+ + \text{mu}^- = 760 \text{ MeV} = \rho^0$$

The pion resonance does not involve charge formation. Eliminating a charge gives:

$$3(4\pi/2a - 1/2a) = 193 \text{ MeV}$$

The proton may consist of two resonant states represented by an average mass of:

$$4[2((4\pi/2a) - 1/2a) + \text{muon}] = 938{\cdot}2 \text{ MeV} = \text{proton}$$

Apparently a charge with rest mass of 2π can acquire a rest mass of $4\pi/2a$ or $1/2a$. Combinations of these units form the resonances and the elementary particles.

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Seasonal Variations of Cæsium-137 in Air at Ground-level during 1960 and 1961

MEASUREMENTS on radioactive fall-out in air and rainwater in different parts of the world from 1954 onwards showed that during late winter and spring an increase in specific activity was observed. This increase was attributed by Stewart[1] and Machta[2] to seasonal effects while it was attributed by Martell[3] mainly to the testing schedule of polar explosions. The presence of 'spring peak' was observed in India and other countries from the measurements made in the spring of 1960 as there were no tests between November 4, 1958, and February 13, 1960.

The spring increase in the concentration of cæsium-137 in the air at ground-level recorded at Bombay during 1957–60 has already been published[4]. The peaks in cæsium-137 activity were observed at Bombay during the period February–May in the years 1957–60. In ref. 4 the peaks in cæsium-137 activity observed at Srinagar, Delhi, Nagpur, Calcutta, Bangalore and Ootacamund during 1960 were also reported. As two French tests were conducted in February and April 1960, respectively, the spring increase observed in 1960 had to be confirmed by similar measurements in 1961.

Since the level of activity in the air during 1961 was very small, samples from 4 northern stations (Srinagar, Delhi, Gangtok and Calcutta) and 4 southern stations (Nagpur, Bombay, Bangalore and Ootacamund) were pooled to determine whether the seasonal effects could be observed during 1961. Fig. 1 gives the levels of cæsium-137 in the ground-level air for the northern stations, the southern stations and the average levels for all the stations. It can be seen from Fig. 1 that in the month of September 1960 the levels of cæsium-137 in the air had reduced to less than 10^{-15} c./m^3 air. After September 1960 an increase is observed. In the northern stations the peak is observed in the month of April 1961 and in the southern stations two peaks are observed in January and May 1961 respectively.

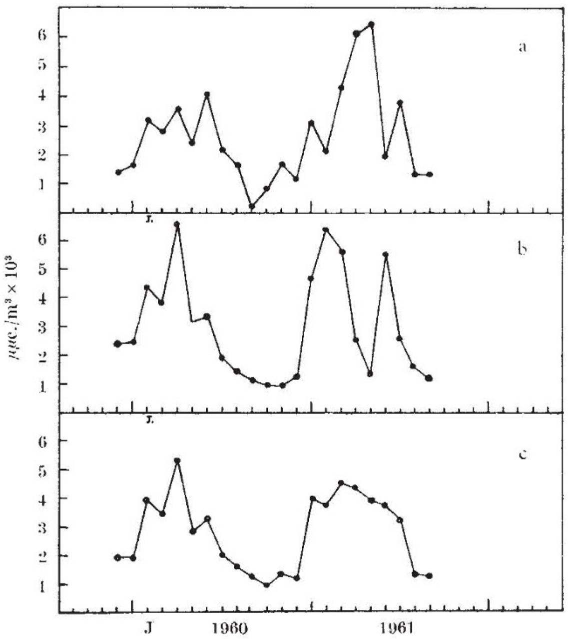

Fig. 1. Cæsium-137 concentrations in the air at ground-level. *a*, Northern stations average; *b*, southern stations average; *c*, average for all stations

It is significant that the peak-levels of activity during 1960 and 1961 are nearly the same in the southern stations and the 1961 peak-levels in the northern stations are even higher than the 1960-levels.

The mechanism of spring increase is not fully understood and different explanations have been offered. Lindblom[5] has observed spring peaks at Stockholm and Edsvalla in Sweden during 1961 and the peak levels at these two stations during 1961 were as high as the levels during 1960. Kuroda[6] has also observed an increase in strontium-90 concentration in spring rains during 1961, the magnitude of which is comparable with that in 1960. He has attributed this to the descent of radioactive fall-out from upper stratosphere to the lower stratosphere.

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Production of Liquid Drops

DURING an investigation into methods of producing small, uniform-sized drops the following observations were made on the mechanism of drop formation when influenced by the application of high voltage.

Drops of water were produced from a vertical stainless-steel, hypodermic needle, 0·27 mm bore and 0·48 mm outside diameter. The tip of the needle was ground flat and thoroughly cleaned before use. Water pressure was provided by a constant liquid head.

In the case where gravitational forces alone applied drops grew to a diameter of about 4 mm before becoming detached from the tip, this occurring once every 3–4 sec. On the application of smoothed, positive, high voltage (about 4 kV) there was a marked change in the mechanism of drop production. In ordinary light water appeared to leave the tip of the needle in a continuous, narrow jet.