later in the chain when amino-acids already produced are further metabolized.

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Tellina magna found in Orkney

DURING Easter 1947, an inspection was made of the seaweed cast up on the west mainland of Orkney. One heavy cast, 3 ft. thick at the water's edge, was found in a sandy bay north of the graveyard north-west of Stromness and opposite the northern extremity of Hoy. The coast is rocky with sandy bays. The rocks are Old Red Sandstone, which erode to form flat slabs sloping towards the sea. About half a mile offshore, a reef of similar rock formation is exposed at low water. There is little chance of anything remaining intact before being cast ashore as the Atlantic waters break on this coast.

The cast weed on this occasion, composed mainly of the fronds of *Laminaria Cloustoni*, had acted as a buffer for several large shells, such as *Pecten*, which were found intact. Normally, such shells become so broken up that they merely add to the shell sand comprising the foreshore in this area.

From among the cast weed a bivalve, 4 in. long, was picked up which when discovered had its two halves hinged; the contents were absent. It has now been identified as *Tellina magna*, a native of the East American coast, North Carolina to West Indies—and is, I am informed, the first recorded instance of a marine invertebrate from the American continent to be found in British waters. Subsequent visits to the same area have produced only limpet shells and one small bivalve. There can be no doubt the cast weed was responsible for bringing the shell ashore intact. How the animal (or its ancestors) crossed the Atlantic can only be speculation. Whether living specimens are to be found off this Orkney coast a dredging expedition must decide.

I wish to acknowledge the interest of the late Mr. R. Elmhirst, of the Marine Biological Station, Millport, Prof. C. M. Yonge, of the University of Glasgow, and Dr. A. C. Stephens, of the Royal Scottish Museum, who were responsible for the identification.

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Nuclear Capture of μ -Mesons

It is well known from delayed-coincidence experiments¹ that negative μ -mesons (mass 215) stopping in light atoms undergo electron decay, whereas those stopping in substances of high atomic number undergo nuclear capture. Both photographic plate^{2,3} and cloud-chamber evidence^{4,5} shows that very few or none of the μ -mesons produce nuclear disintegration stars in heavy elements. Counter-work⁶ precludes production of photons, though there is evidence for emission of neutrons following meson capture^{7,8}. It is of interest to discuss the above evidence in the light of observations on μ -mesons stopping in nuclear emulsions.

The emulsion consists of microcrystals of silver bromide, about 0.2μ in diameter, suspended in gelatin. Thus, a meson coming to rest in the emulsion will, in general, spend the last fraction of a micron of its range either entirely within heavy atoms, or in light ones. Hence the probability of the meson stopping in heavy or light atoms will be almost independent of the complicated processes of energy-loss below a velocity of about 5×10^8 cm./sec., and can be estimated from experimental data on stopping power. Allowing a positive excess of 15 per cent, we thus calculate that the proportion of mesons which are negative μ -mesons stopping in silver or bromine atoms is 35 per cent. In Kodak electron-sensitive plates exposed to cosmic rays, we in fact observe that 30 ± 6 per cent of the single mesons (the great majority of which are known to be μ g particles⁹) fail to give a decay electron on coming to rest. This figure is in good agreement with that obtained by other observers⁹.

First of all, it is clear that, quite apart from the fact that it is contrary to the concept of short-range nuclear forces, the rest-energy of the μ -meson cannot be shared directly among several nucleons, otherwise we should inevitably observe fast protons emitted. Let us suppose that the entire rest-energy of the μ -meson is converted into kinetic energy of (a) two, and (b) one fast neutron. Process (a), which is the same as that which probably occurs following negative π -meson capture², should result in many cases in the formation of a star, for it is difficult to see how at least one of the neutrons can avoid producing general nuclear excitation and evaporation. If, as seems extremely unlikely, the latter did not occur, half the resulting palladium or selenium isotopes would be stable, and the remainder would probably be β -active¹⁰. If these were short-lived isotopes, the proportion of mesons not giving electrons would be greatly reduced. The β -particles would also be immediately distinguishable on account of their small momenta. In actual fact, the momenta of the decay electrons, obtained from Coulomb scattering measurements, appear in all cases to exceed 10 MeV./c. (Where accurate measurements on long tracks are possible, the observed values are much higher than this⁹.) Thus any β -decay which might occur would have to be fairly long-lived. In this connexion, it is interesting to note that we have observed no significant difference between the proportion of mesons not giving electrons in plates exposed for six days at Jungfraujoch and developed four days later, and those in plates exposed for three weeks and developed one month later.

In process (b) the nucleus (which will be stable to β -decay) must take up the momentum of the neutron, amounting to 450 MeV./c., and will have a range in