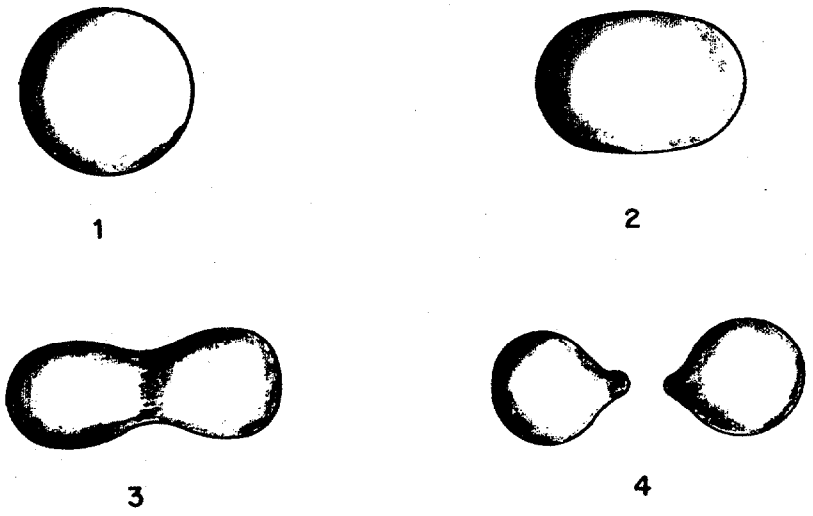

Figure 54. Fission of a liquid drop.

Z	44	45	46	47	48	49	50
Neutron Binding Energy (Mev)	2.5	6.8	3.6	7.8	4.7	9.0	5.8

(where Z = 50 is the stable value for Z if A = 118). Thus, neutrons may be lightly bound to fission fragments. Whenever neutron emission is energetically possible, neutron emission is likely, because of the absence of a barrier for neutrons. As a matter of fact, one could conclude from observations that considerable excitation energy must be present in the fragments, because from one to three neutrons are emitted per fission in the case of U^{235}.

The energies of the neutrons that come off at fission are given in the distribution curve in Figure 55. In the center of gravity system of neutron and fission fragment, the neutron energy distribution would be approximately Maxwellian, with a "temperature" corresponding to the excitation of the fragment. To get the theoretical curve for the distribution in the laboratory system, one would have to take account of the motion of the fission fragment and the dependence of emission probability on neutron energy.

In addition to these prompt neutrons about 1% are delayed. To explain the emission of delayed neutrons, consider (Figure 56) a fragment A, which undergoes a β disintegration to a nucleus B. Usually this disintegration will go to the ground state of B, but occasionally the nucleus B may end up in an excited state with excitation energy greather than B. E., the binding energy of a neutron. In such a case, neutron emission becomes quite likely. Such neutrons would come off very

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