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The Living Record of Science

《自然》百年科学经典

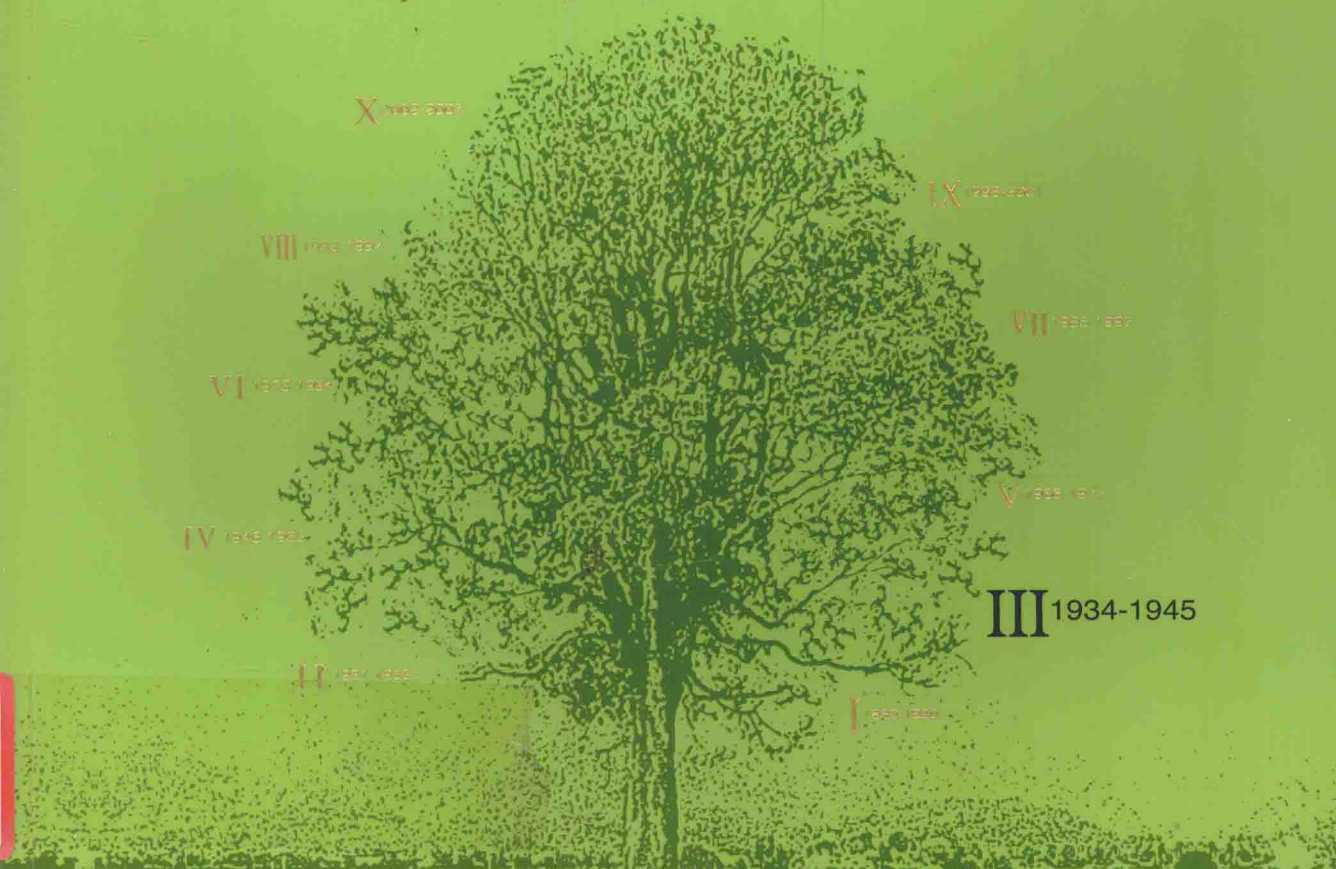
英汉对照版（平装本）

第三卷（下）

总顾问：李政道（Tsung-Dao Lee）

英方主编：Sir John Maddox
Philip Campbell

中方主编：路甬祥



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FOREIGN LANGUAGE TEACHING AND RESEARCH PRESS · MACMILLAN EDUCATION · NATURE RESEARCH

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III

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Volume III

(1934-1945)

Products of the Fission of the Uranium Nucleus

L. Meitner and O. R. Frisch

Editor's Note

Lise Meitner and Otto Frisch here report new experiments probing the products of uranium fission experiments. Earlier work suggested that fission fragments should emerge with energies of several hundred electron volts. Here the researchers sent neutrons into a sample of uranium hydroxide and attempted to collect the fission fragments 1 mm away, either in a paper surface or in water. They found evidence for a range of different fission fragments. It seemed most unlikely that the mere absorption of a neutron could give a uranium nucleus enough kinetic energy to reach their collecting surfaces. This new technique offered a route to the more detailed examination of the nuclear fragments created in fission processes.

O. Hahn and F. Strassmann[1] have discovered a new type of nuclear reaction, the splitting into two smaller nuclei of the nuclei of uranium and thorium under neutron bombardment. Thus they demonstrated the production of nuclei of barium, lanthanum, strontium, yttrium, and, more recently, of xenon and caesium.

It can be shown by simple considerations that this type of nuclear reaction may be described in an essentially classical way like the fission of a liquid drop, and that the fission products must fly apart with kinetic energies of the order of hundred million electron-volts each[2]. Evidence for these high energies was first given by O. R. Frisch[3] and almost simultaneously by a number of other investigators[4].

The possibility of making use of these high energies in order to collect the fission products in the same way as one collects the active deposit from alpha-recoil has been pointed out by L. Meitner (see ref. 3). In the meantime, F. Joliot has independently made experiments of this type[5]. We have now carried out some experiments, using the recently completed high-tension equipment of the Institute of Theoretical Physics, Copenhagen.

A thin layer of uranium hydroxide, placed at a distance of 1 mm. from a collecting surface, was exposed to neutron bombardment. The neutrons were produced by bombarding lithium or beryllium targets with deuterons of energies up to 800 kilovolts. In the first experiments, a piece of paper was used as a collecting surface (after making sure that the paper did not get active by itself under neutron bombardment). About two minutes after interrupting the irradiation, the paper was placed near a Geiger-Müller counter with aluminium walls of 0.1 mm. thickness. We found a well-measurable activity which decayed first quickly (about two minutes half-value period) and then more slowly. No attempt was made to analyse the slow decay in view of the large number of periods to be expected.