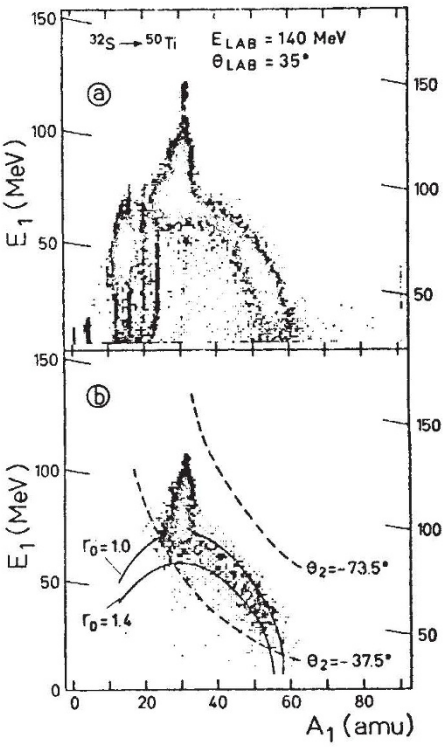


**Fig. 1** Plot of the energy and mass number of particles emitted from the interaction of 140 MeV $^{32}S$ with $^{50}Ti$. The top diagram shows all particles and the lower one only those emitted in coincidence with a second particle entering an ionisation chamber. The solid lines are calculated for the electrostatic repulsion of two spheres and the dashed lines are the kinematic constraints due to the detector geometry.

each interaction it is possible to measure the energy ($E_1$) and mass ($A_1$) of one of the reaction products by a time-of-flight telescope set at 35° to the incident beam and then the energy and energy loss in an ionisation chamber of a second particle emitted on the opposite side of the beam at the same time as the first, together with its angles of emission in and normal to the scattering plane.

Some of the results are shown in the figure in which each point represents a particle of energy $E_1$ and mass $A_1$ detected by the time-of-flight telescope. The top part shows all particles and the lower part only those emitted in coincidence with a second particle entering the ionisation chamber.

In these plots, the vertical lines around $A = 32$ correspond to the incident $^{32}S$ ions that have undergone peripheral elastic or quasielastic interactions with the loss or gain of a few nucleons. These interactions have been extensively studied and are now quite well understood. The broad band of points extending from $A \approx 32$ to $A \approx 50$ corresponds mostly to particles coming from the fission of the compound nucleus with $A \gtrsim 82$ into two fragments of similar mass.

This identification is made by calculating the kinetic energies for the electrostatic repulsion of two charged spheres separated by $\{r_0(A_1^{1/3}+A_2^{1/3})+2\}$ fm for $r_0 = 1.0$ and 1.4; with the lighter fragments following the stability valley. The results of this calculation are shown by the solid lines in the figure, and they follow the experimental distribution very well.

Confirmation of this comes from the identification and kinematic correlations of the coincident particles. The ionisation chamber measurements of the second particle give its charge $Z_2$, and assuming its mass is $A_2 = 2Z_2+1$, the total mass of the fissioning nucleus is $A_1+A_2$. For all values of $Z_2$ between 12 and 16 the average value of $A_1+A_2$ is between 78.2 and 79.2 compared with the known total $A = 82$. This indicates that on the average about three nucleons are lost in the reaction. The mass distribution of the fission products is uniform from $A \approx 35$ to $A \approx 55$.

Additional studies of the energy distributions of the secondary particles also confirmed that fission had taken place. The correlation between $A_1$ and the angle of emission of the second particle showed that several nucleons are evaporated during the reaction, but it was not possible to distinguish between nucleons emitted before or after the fission process.

This experiment gives the first definite evidence for fission in this mass region and provides a way of studying the fission dynamics of highly excited nuclei with large angular momenta. □

# Suspicious husbands

*by John Krebs*

On evolutionary grounds we would expect husbands to be suspicious. If a male is about to spend considerable time and effort in helping his mate to rear young he ought (in evolutionary terms) to check carefully that the young carry his genes. Male lions and langurs may even go to the extreme of killing off all the extant babies when they first take over a new harem: this ensures that the females will only rear children of the new group leader. The female herself, being equally related to her offspring regardless of the father, is not necessarily averse to infidelity.

While one can easily amuse oneself by developing such arguments as the logical outcome of the rules of natural selection (and perhaps even speculate on human analogies) it is not often that one comes across an experimental test. However, Erickson and Zenone (*Science*, **192**, 1353–54; 1976) have recently shown that male ring doves behave exactly as predicted by the theory.

The male ring dove shares with his mate the parental duties of nest building, incubation, and feeding the young, and so should be suspicious of a female which might have been inseminated by another male. The basis of Erickson and Zenone's experiment was the well established observation that male courtship displays have an important effect in stimulating ovarian activity. After a certain amount of courtship from a male, the female ring dove secretes ovarian steroids which cause her to start the so-called nest soliciting display, indicating her readiness to build a nest. Erickson and Zenone tested the reaction of 35 males to two groups of females: one that had been pre-exposed to courting males and brought into nesting condition, and one that had been kept in isolation. The first group of females immediately started nest soliciting when brought into contact with the test males, while the others did not. The reaction of the males was clear: they showed more aggression and less courtship towards the 'sexed up' females. Thus, as the theory predicts, males were suspicious of females that gave away the fact that they had been consorting with other males, and could have been fertilised by them. □

# Haemopoiesis discussed

*from J. J. T. Owen*

A symposium on Haemopoiesis in Vertebrate Embryos was held at the Institut d'Embryologie, Nogent-sur-Marne, France, on June 14–16. It was sponsored by the Delegation Generale à la Recherche Scientifique et Technique, Centre National de la Recherche Scientifique and the International Society of Developmental Biologists.

Many meetings these days seem to concentrate on highly specialist topics; perhaps it may be said that we learn more and more about less and less. This meeting was different and the organising committee should be congratulated on getting together scientists from various disciplines including embryology, immunology and haematology.

E. Cooper (Los Angeles) opened the meeting with an account of the evolution of blood cells and pointed out that the most primitive blood cell, a protohaemocyte, was involved in phagocytosis and nutrition. A lively debate followed about the origins of haemopoietic stem cells during ontogeny—an important topic that has generated a good deal of heat since the days of Maximow. In particular, the origins of thymus lymphocytes attracted special